TAMPEREEN TEKNILLINEN YLIOPISTO
TAMPERE UNIVERSITY OF TECHNOLOGY

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RESOURCES AND CAPABILITES CREATING COMPETITIVE ADVANTAGE IN BUSINESS ECOSYSTEMS

Master of Science thesis

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ABSTRACT

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Literature on competitive advantage is highly polarized. Competitive advantage is claimed to stem from either internal or external sources. Resource-based view dominates the internal branch while industry related aspects dominate the other. More recently a business ecosystem view has emerged to examine the external environment. The objective of this research was to combine the two lines of literature. The research questions of the study were: What resources and capabilities create competitive advantage? and What is the business ecosystem's effect on key resources and capabilities? To answer the questions, a framework was developed based on literature and then tested empirically.

Literature review revealed that discussion on business ecosystem much focuses on company roles or strategies. In addition, the evolutionary stages of an ecosystem are central. Based on the literature review, a framework was developed linking a business ecosystem's evolutionary stage and a company's ecosystem strategy to resources and capabilities creating competitive advantage. For the multiple case study, a qualitative approach was chosen. A total of five semi structured interviews were conducted in four case companies to explore their ecosystem structures and competitive advantage. The case companies were to represent two kinds of ecosystem groups but after the interviews and ecosystem analysis the cases were decided to examine uniquely.

It was discovered that business ecosystems differ on behalf of size and nature of relationships. Only one resource, employees' skills and experience, was common to all companies. Other resources and capabilities two companies had in common were technology, rapid adaptation and relationships to stakeholders. The only connective feature in the case of technology was a tangible product. Companies having rapid adaptation as a competitive advantage both had a small ecosystem. Companies having relationships to stakeholders in common had no distinct connective feature apart from the small size of the company compared to the customer. Other resources and capabilities were company specific being for example understanding customer need, network readiness, relationships between employees and management, and references. Case companies' ecosystem strategies or ecosystem's evolutionary stage did not explain the differences in resources and capabilities. Thus the framework developed was to be abandoned. To fully address the research question, unstructured interviews and a quantitative study with a larger sample size is needed. Additional future research areas are the characteristics of ecosystems and the sources of competitive advantage from the customers' point of view.

TIIVISTELMÄ

MÄKILÄ, PAULIINA: Kilpailuetua tuottavat resurssit ja kyvykkyydet liiketoimintaekosysteemeissä
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Kilpailuetua käsittelevä kirjallisuus on kahtia jakautunutta. Kilpailuedun on väitetty kumpuavan joko yrityksen sisältä tai sen ulkopuolelta. Resurssipohjainen näkemys hallitsee sisäistä haaraa ja teollisuudenala-ajattelu ulkoista. Viime aikoina liiketoimintaekosysteemiajattelua on käytetty ulkoisen ympäristön tarkasteluun. Tämän tutkimuksen tarkoituksena oli yhdistää nämä kaksi kirjallisuudenhaaraa. Tutkimuskysymykset olivat: Mitkä resurssit ja kyvykkyydet luovat kilpailuetua? ja Mikä on liiketoimintaekosysteemin vaikutus tärkeimpiin resursseihin ja kyvykkyyksiin? Jotta näihin kysymyksiin saatiin vastaus, kehitettiin kirjallisuuteen perustuva viitekehys, jota testattiin empiirisesti.

Kirjallisuuskatsaus paljasti, että liiketoimintaekosysteemeihin liittyvä kirjallisuus keskittyy pitkälti yritysten rooleihin tai strategioihin. Keskeinen aihe on myös ekosysteemin kehityskaaren vaiheet. Kirjallisuuskatsauksen perusteella kehitettiin viitekehys, joka yhdistää ekosysteemin kehityskaaren vaiheen ja yrityksen strategian kilpailuetua tuottaviin resursseihin ja kyvykkyyksiin. Tapaustutkimus toteutettiin usean tapauksen tutkimuksen kvalitatiivisella otteella. Neljässä kohdeyrityksessä toteutettiin yhteensä viisi puolistrukturoitua haastattelua, joilla tutkittiin yritysten ekosysteemien rakennetta ja kilpailuetua. Kohdeyritysten oli määrä ekosysteemiensä puolesta edustaa kahta erilaista ryhmää, mutta haastattelujen ja ekosysteemien analysoinnin jälkeen jokaista tapausta päätettiin tarkastella itsenäisesti.

Tutkimuksessa havaittiin, että liiketoimintaekosysteemien koko ja yritysten välisten suhteiden luonne vaihtelee. Vain yksi resurssi, työntekijöiden osaamien ja kokemus, oli kaikille yrityksille yhteinen. Kahdelle yritykselle yhteisiä resursseja ja kyvykkyyksiä olivat teknologia, nopea sopeutuminen ja suhteet sidosryhmiin. Ainoa yhdistävä tekijä teknologian tapauksessa oli fyysinen tuote. Nopeassa sopeutumisessa yhdistävää oli pieni ekosysteemi. Suhteet sidosryhmiin kilpailueduksi valinneilla yrityksillä ei ollut muuta merkittävää yhteistä piirrettä kuin pieni koko verrattuna asiakkaaseen. Muut resurssit ja kyvykkyydet olivat yrityskohtaisia, kuten esimerkiksi asiakastarpeen ymmärtäminen, verkoston valmius, johdon ja henkilöstön väliset suhteet ja referenssit. Kohdeyritysten ekosysteemistrategiat tai ekosysteemin kehitysvaihe eivät selittäneet eroja resursseissa ja kyvykkyyksissä. Siten kirjallisuudesta johdettu viitekehys hylättiin. Jotta tutkimuskysymykseen pystytään täysin vastaamaan, avoimia haastatteluja ja kvantitatiivinen kyselytutkimus suuremmalla näytekoolla tarvitaan. Muita tulevaisuuden tutkimuskohteita ovat ekosysteemien ominaisuudet sekä kilpailuedun lähteet asiakkaan näkökulmasta.

PREFACE

The half a year working on this thesis has been one of my best. Not only have I met wonderful people and gained friends but I have also had the chance to take advantage of what I have learned during my studies at Tampere University of Technology. I have learned a lot during the thesis though there is still lot to be discovered.

First, I would like to thank those who gave me the opportunity for this thesis. I would like thank Saku for the interesting and challenging topic due to which I learned a whole new line of thought. In addition, I would like to thank Marko and Tero for their instructions and advice throughout the process and for guiding me back to the right path when I was lost. I would also like to thank my colleagues for their tips and tricks. Big thanks also goes to case company respondents who managed to squeeze me into their full schedules. I could not have done this thesis if it was not because of You.

Finally, I would like to thank my parents. My mother for saving my kindergarten drawing in which I wear a teekkari cap and dream to be a master of science. And my father for always being an example to me of taking up a challenge and never giving up. I would also like to thank my fellow fuksis and all the people I have met along the way, some of whom became friends for life. You made this journey memorable! Last but not least, I would like to thank my partner Jari for living the ups and downs of life with me. No matter the obstacle, You were there.

Tampere, 14th of May 2015

Pauliina Mäkilä

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1. INTRODUCTION

1.1 Background

For over 50 years researchers have pondered the question "Why do some companies persistently outperform others?" Managers on the other hand face the question "How can my company be one of those who outperform competitors?" Collins & Porras (2004) have recently shaken the myths of the business world by suggesting that successful companies maintain their basic ideology for decays while striving for progress without an urgent need to make a lot of money (Collins & Porras 2004, p. 86, 134). Although a rule for riches does not exist, this thesis seeks to shed light on both the aforementioned questions.

The foundation of strategic management research today lies in the framework presenting that a company can outperform its competitors by exploiting its internal strengths in a way that allows the company to take advantage of external opportunities and neutralize external threats while avoiding internal weaknesses (Andrews 1971, p. 100). Most research however focuses on either external opportunities and threats (e.g. Porter 1980; 1985) or internal strengths and weaknesses (e.g. Barney 1991; Grant 1991; Penrose 1958/2009; Prahalad & Hamel 1990; Teece 2007; Wernerfelt 1984). The research focusing on external opportunities and threats examines industries, their structure and company size for example, whereas research on internal strengths puts a company's resources and capabilities under the microscope. It now seems both theoretically (Barney 1991) and empirically (Galbreath & Galvin 2008) that the latter, the resource-based view, better explains why some companies outperform others and the view has become dominant in the strategic management field.

Even though an extensive attention has been paid to company resources during the years, ecosystem and platform thinking now challenges the resource-based view. The ecosystem perspective considers a company as a part of a network of interdependent organizations exceeding industry boundaries (Moore 1993; Gawer & Cusumano 2002) making a company dependent on other's resources on top of its own. It appears that companies which focus not only on their own resources but on their business ecosystem's overall health (Iansiti & Levien 2004) and cooperative actions (Young et al. 1996) succeed better. Since the literature is polarized – industry versus resources i.e. external versus internal – and company behavior is incompletely understood if the network is neglected (Gulati et al. 2000), there is an evident need for a synthesis representing the middle way.

1.2 Research Scope and Questions

At the beginning of the thesis the research topic was not fully formulated on behalf of the supervisors but a lot of choices were left for the researcher to decide. For example the choice on how to treat competitive advantage and a company's environment were open.

For the analysis and characterization of a company's environment, a business ecosystem perspective was chosen. Also Teece (2007) recently chose the business ecosystem as an environmental context. The choice to treat a company's environment through a business ecosystem view is contemporary and also quite intriguing. Traditionally an environment is examined by characterizing an industry the company is active in but from the business ecosystem perspective such a thing as industry is practically nonexistent and thus irrelevant (Moore 1993). Examples of perishing industry boundaries do exist. Consider for example Amazon – a bookstore but also a publisher (Diana 23.9.2012), or a smartphone – practically a handheld computer (Hill et al. 2014, p. 47). In this sense the ecosystem view gives the study and the thesis a timelier tone than let us say a Porter's five forces framework would. As for the analysis of internal strengths and weaknesses a resource-based view deemed appropriate. This is due to the central position this view has attained during the years. Also a lot of literature builds on the resource-based view providing material for the literature review and analysis.

Recent research (e.g. Adner & Kapoor 2010; Cockburn et al. 2000) acknowledges the need to bridge the gap between the two competing views, industry versus resources. There has been some effort towards a more convergent perspective (Cockburn et al. 2000; Teece 2007) but the work is however incomplete. Additionally, the network in which a company is embedded in has, on top of the company's own resource endowments, an effect on rents that accrue to the company (Gulati et al. 2000).

The study conducted for this thesis seeks to find the relationship between a company's business ecosystem and resources and capabilities. As such, the research is explanatory (Saunders et al. 2009, p. 140-141). The research question is divided in two. By answering to these questions it is possible to identify resources and capabilities creating competitive advantage that are common to all companies regardless of their role in the ecosystem as well as to lure out any differences. The research questions are:

1. *What resources and capabilities create competitive advantage?*
2. *What is the business ecosystem's effect on key resources and capabilities?*

The objectives derived from the research questions are to identify resources and capabilities creating competitive advantage as well as to recognize those affected by business ecosystem. In order to do so, research on resource-based view and business ecosystems is combined. Based on this, a framework is built to illustrate the relationship between a

business ecosystem and resources creating competitive advantage. The research process is divided in two. In the first phase an extensive literature review is conducted. The review forms the basis for building the framework. In the second phase the framework is empirically tested in case companies and evaluated afterwards.

1.3 Research Philosophy

It is always appropriate to recognize the research philosophical premises. Central commitments are those of ontology and epistemology. Ontology is concerned with the question of what is reality and what is accepted as proofs. Furthermore epistemology deals with the relationship between the researcher and research subject and asks for example how knowledge can be gained. (Hirsjärvi et al. 1997, p. 126)

The research philosophy of the researcher is best described as pragmatism with a pinch of critical realism. Pragmatism emphasized the research question as a determinant of ontology and epistemology and the choices on research methods are made based on how to achieve the best results (Saunders et al. 2009, p. 109-110, 119). The ontological assumption is that reality can exist both independently or in social constructs depending on the research question (Saunders et al. 2009, p. 119). Nevertheless a critical realism is adopted in that reality is always experienced through sensations and senses can be deceptive (Saunders et al. 2009, p. 115).

As for epistemology, pragmatism considers both observable phenomena and subjective meanings to provide knowledge depending on the research question whereas critical realism adds a focus on misinterpretation and context (Saunders et al. 2009, p. 119). The role a researcher's values play in research is also an important consideration. Pragmatism suggests a voluntary transition between objective and subjective views (Saunders et al. 2009, p. 119) but the researcher however considers this transition as well as pure objectivism to be impossible. Instead, research is considered to be value laden with biases caused by e.g. cultural experiences and upbringing of the researcher which all impact the research (Saunders et al. 2009, p. 119).

1.4 Structure of the Thesis

This thesis is divided into eight chapters. After the introduction, chapters two, three and four present the literature review. Chapter two focuses on a business ecosystem first defining it and then discussing how a business ecosystem evolves and what kind of strategies companies can have in an ecosystem. Chapter three discusses competitive advantage by defining it and afterwards discussing its sustainability which faces divergent opinions. Finally on Chapter four, sources of competitive advantage are presented. After an overview of the literature on the topic, the discussion focuses on the resource-based view. Taking the resource-based view's perspective prerequisites for competitive

advantage are presented. In the end the VRIO framework is introduced and capabilities are further discussed.

Chapter five draws from the literature review an presents a framework that links a business ecosystem's evolutionary stage and a company's ecosystem strategy with the resources and capabilities creating competitive advantage. For each ecosystem strategy resources and capabilities specifically suited for the strategy are recognized. In addition, the evolutionary stage of an ecosystem is taken into account.

Chapter six describes the utilized research methods in detail introducing research design, data collection and analysis procedures as well as the case companies. The thesis will focus on four case companies in which semi-structured interviews were conducted. The following Chapter seven discusses the results starting from the business ecosystem perspective. First, the case companies' ecosystems are introduced and relationships in them discussed. Afterwards ecosystem strategies are presented with links to the literature. Then, resources and capabilities creating competitive advantage for the case companies are introduced. Resources and capabilities common for two of more companies are discussed first and company specific resources and capabilities after them. Finally, the results on business ecosystems and on resources and capabilities are recapitulated and discussed in relation with the framework presented in Chapter five.

Chapter eight summarizes the theoretical contribution, managerial implications and the limitations of the research in this thesis. Also future directions are pointed out. Following that, the references are reported and the interview outline is attached as an appendix.

2. BUSINESS ECOSYSTEM

Industries, as we have traditionally known them, are eroding. Many companies not only manufacture goods but are active in service business as well and technological changes spread across traditional industry boundaries (Iansiti & Levien 2004). Value is in many instances no longer created step by step in a pipeline but through interconnected networks – a value chain has turned into a value network. Without an understanding of the network which a company is embedded in, only incomplete understanding of company behavior and performance is gained (Gulati et al. 2000). Ecosystem thinking encourages companies to focus no only on their own performance but on the other actors needed to create and deliver value as well (Adner 2012, p. 33).

The ecosystem analogy is widespread ranging from industry ecosystems (Frosch & Gallopoulos 1989) to innovation (Adner 2006; Adner & Kapoor 2010) and knowledge (Almeida & Kogut 1999; Clarysse et al. 2014; Phelps et al. 2012) ecosystems. These ecosystems for the most part give a limited view to a company's environment and represent only a part of it. They are thus ruled out of the scope of the thesis as such, though literature is applied when appropriate. As for a company's environment, a more all-encompassing business ecosystem perspective is used. In this chapter a business ecosystem is explained and its evolutionary stages are introduced. Finally, roles or strategies companies can have in an ecosystem are presented.

2.1 What is a Business Ecosystem?

Researchers have for some decades drawn from biological analogies in order to explain business phenomena (e.g. Frosch & Gallopoulos 1989; Gulati et al. 2000; Moore 1993; Penrose 1952). Moore (1993) presents business ecosystem thinking as a means to understand a company's environment describing it as a complex network of connections and relationships. According to Oxford English Dictionary an ecosystem is "A biological system composed of all the organisms found in a particular physical environment, interacting with it and with each other. Also in extended use: a complex system resembling this." (Oxford English Dictionary). Following the analogy, companies in a business ecosystem are affected by the ecosystem and they affect the ecosystem in turn i.e. companies depend on one another (Moore 1993). Additionally the ecosystem allows companies to create and deliver value that no single company could create alone (Adner 2006). Parallel to nature, companies in an ecosystem co-evolve capabilities, share the ecosystem's fate and radical changes have the potential to destroy an ecosystem as well as to give birth to a new one (Moore 1993). A single company, however, has the poten-

tial to tear down an entire ecosystem just as an ecosystem has the potential to end a company (Iansiti & Levien 2004).

Companies as a part of an ecosystem are members of networks spanning across a variety of industries rather than just members of a single industry (Moore 1993) and not all members in an industry belong to the same ecosystem (den Hartigh & van Asseldonk 2004). These networks consist of organizations that have an effect on a company's business such as competitors, suppliers, distributors, outsourcing companies, related product or service providers i.e. complementors, technology providers, and customers (Iansiti & Levien 2004; Teece 2007). A business ecosystem is illustrated in Figure 1. A business ecosystem is in many instances characterized by both competition and cooperation (Iansiti & Levien 2004; Moore 1993). Cooperation aims for co-creation of value that no single ecosystem member could have delivered on its own (Normann & Ramírez 1993). Eventually, according to Moore (1993), it is ecosystems that compete against one another, not individual companies. Like in nature, competition is not about which particular ecosystem stays alive. More important is that the competition between ecosystems is fierce and fair (Moore 1993).

A business ecosystem resembles a business network at a glance. The main difference is however that a business network is most often considered to consist of companies hav-

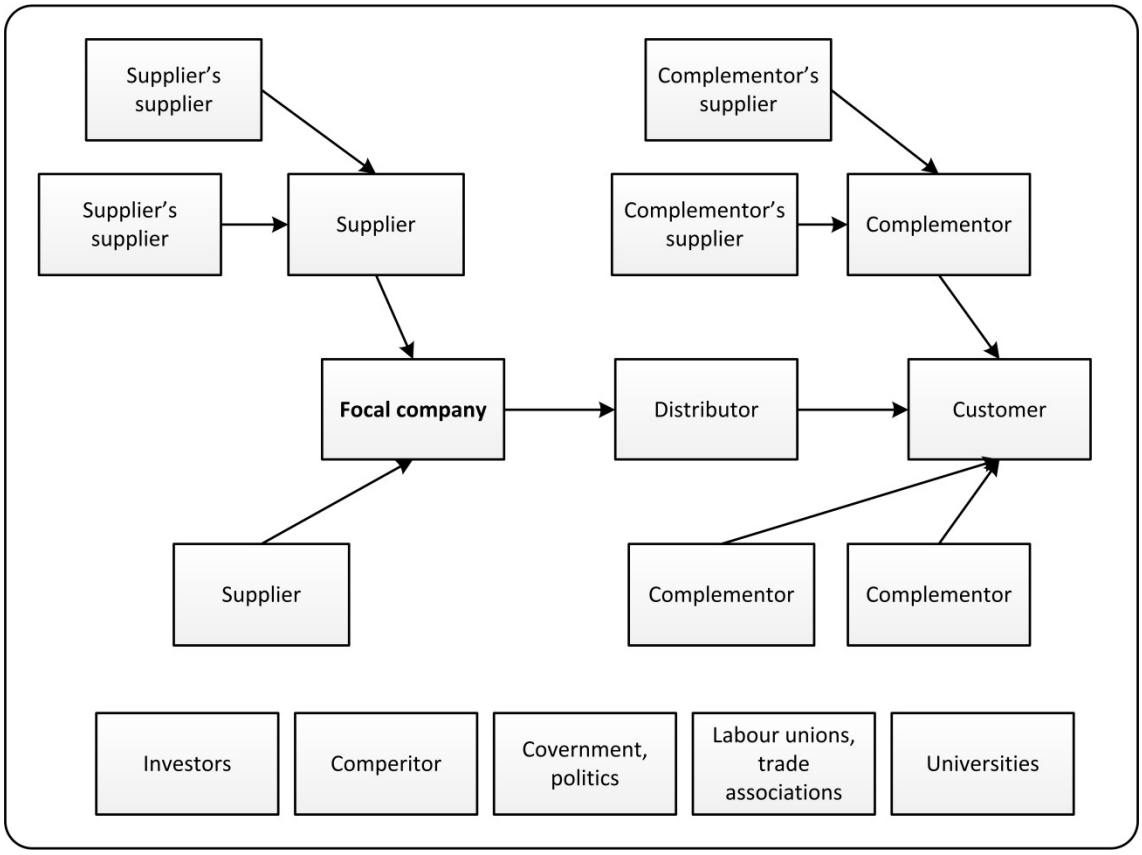


Figure 1. *An illustration of an ecosystem (adapted from Adner & Kapoor 2010).*

ing very close relationships to one another whereas companies in a business ecosystem might not have personal relationships at all. This is the case for example between a smart phone manufacturer and the many individuals creating applications for fun. The business ecosystem thus gives a wider perspective to companies' environment than sole network view does. Furthermore, network literature tends to stick to industries which are irrelevant from ecosystem perspective's point of view.

A few critical words must be said. A business ecosystem cannot be described using a strictly biological metaphor. A biological ecosystem evolves without a plan and without a controlling agent, but a business ecosystem consists of people capable of planning the future and making decisions consciously (Moore 1993). Iansiti & Levien (2004) point out that a business ecosystem is actually closer to a biological community than a biological ecosystem but the term ecosystem is used to emphasize complexity and biological analogy. On top of the critique on biological metaphor, an ecosystem does not always enhance value creation and delivery but bottleneck exist as upstream component and downstream complement challenges (Adner & Kapoor 2010).

In summary, a business ecosystem is a complex network of interconnected companies spanning across industries. The connections are both cooperative and competitive but as a whole, the network allows the creation of greater value than any single company would achieve alone. This is the definition used in the thesis when talking about business ecosystems.

2.2 The Evolutionary Stages of a Business Ecosystem by Moore

Literature on industry life-cycle exists (see Peltoniemi 2011 for a review) but the ecosystem thinking encourages abandoning traditional industries. In addition, literature on industry life-cycle explains evolution "through technological developments consisting of decreasing product variety and emerging scale economies" (Peltoniemi 2011, p. 350) which is inconsistent with the business ecosystem view where companies are highly interconnected, complementors constantly increase the product variety and no single company, with few exceptions, "do it all" gaining scale economies. Literature on industry evolution was therefore ruled out when investigating business ecosystem's evolution. There is some literature on business network evolution as well but, as said, a business network is somewhat different from a business ecosystem. Thus the literature on network evolution is to be applied with caution to business ecosystems and it was mainly left out of the literature review.

Some literature on business ecosystem evolution exists (e.g. Rong 2011; Rong & Shi 2014) but proved to be hard to access. Five evolutionary stages presented by Rong & Shi (2014, p. 137-138) are however very similar to those presented by Moore. Moore (1993) recognizes four evolutionary stages of an ecosystem as presented in Figure 2.

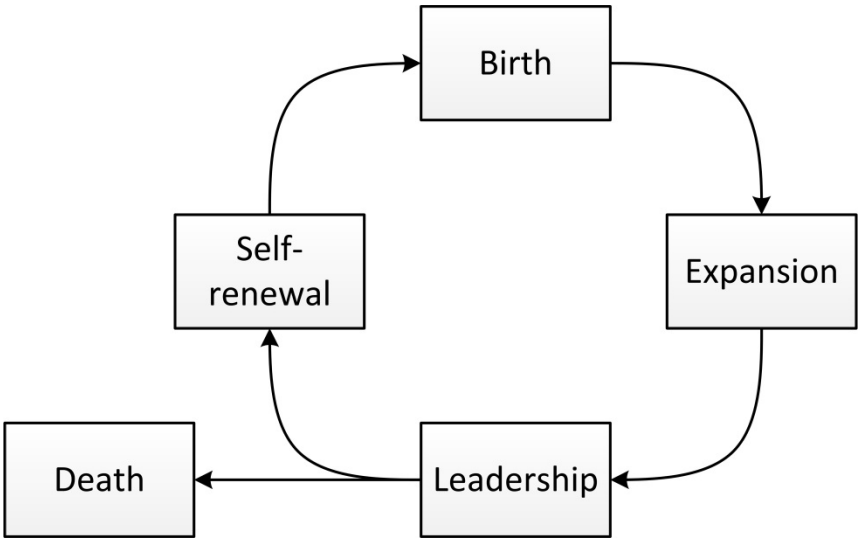


Figure 2. *The evolutionary stages of an ecosystem (based on Moore 1993).*

The stages are not definite but often blur when an ecosystem moves from one stage into the next. Since the evolutionary stages presented by Moore were accessible, they provide the basis for evolutionary examination of a business ecosystem's evolution.

According to Moore (1993), at a birth stage, a business ecosystem develops around a new innovation called a seed innovation. Seed innovations are often technical or product innovations and also range from processes (Davenport 1993) to business models (Lindgardt et al. 2009). Rong & Shi (2014, p. 137) describe the stage as an emergence phase characterized by a proposal of a new solution and a production of a simple supply chain. Gawer (2014) on the other hand suggests that an ecosystem is part of a continuum from internal platform to supply chain platform to industry platform, the last one also known as a business ecosystem. Interface openness and available capabilities increase gradually from internal platforms to ecosystems and a business ecosystem therefore does not develop per se but is formed from a supply chain platform (Gawer 2014). Nevertheless, companies must define the right customer value proposition of a new product or service during the birth stage as well as to implement it. Cooperation in implementation helps to complete the full package of value and, from the ecosystem leader's point of view, prevents competing ecosystems to arise by locking in important follower companies (Moore 1993). Rong & Shi (2014, p. 137) call these actions converging but suggest that they take place later in the ecosystem's development. The competitive challenges of the birth stage relate to protecting the company's ideas from competitors and building a network with lead customers, key suppliers and channels. (Moore 1993) The network building is crucial as the networks a company gets embedded in have a significant effect on future development (Halinen & Törnroos 1998; Hoffmann 2007). Innovations on behalf of suppliers and complementors are often necessary for the true potential of the innovation to be realized (Adner & Kapoor 2010).

Moore (1993) names the second stage an expansion stage whereas Rong & Shi (2014, p. 137) call a similar stage a diversifying phase. In this stage the ecosystem expands (Moore 1993) and many alternative solutions exist (Rong & Shi 2014, p. 137). Some, but not all, ecosystems face competition as closely matched rival ecosystems choose to fight for dominance in strategic markets or for market share. Competition extends beyond individual companies as ecosystems mobilize suppliers, partners and customers to join up (Moore 1993) though the partner network is still very flexible (Rong & Shi 2014, p. 137). Eventually, a single ecosystem proves victorious or rival ecosystems reach a semi-stable state in which the balance fluctuates from time to time but neither ecosystem dies out. Established and wide ecosystems have the power to crush smaller ecosystems in the expansion stage as the first ones have the possibility to employ marketing and sales resources, and large-scale production and distribution management. In other words, established ecosystems are better positioned to fulfill the two basic conditions necessary for expansion: a business concept valued by a large number of customers, and the potential to scale up the concept to reach the market. (Moore 1993)

As the structure of the value-adding components and processes central to the business ecosystem stabilize while growth and profitability are strong enough to be considered worth fighting for, Moore (1993) suggests the business ecosystem to be in a leadership stage. Network stability and an emergence of a dominant design can also be described as a consolidation phase (Rong & Shi 2014, p. 137). The leadership or consolidation stage is characterized by efforts to guide the ecosystem's investment directions, technical standards, and key elements of value (Moore 1993; Rong & Shi 2014, p. 137) . However, the stability of this stage enables the ecosystem to become less dependent on the original leader. This is due to standards, interfaces, and customer-supplier relations for example. A company's challenge in the leadership stage is to encourage "suppliers and customers to work together to continue improving the complete offer" (Moore 1993, p. 77) by providing a compelling vision for the future. Further, a company faces challenges in maintaining "strong bargaining power in relation to other players in the ecosystem" (Moore 1993, p. 77).

When mature business ecosystems are threatened by rising new ecosystems and innovations, a company in the ecosystem faces self-renewal, or death (Moore 1993; Rong & Shi 2014, p. 138). Similar situation occurs when environmental conditions change dramatically. These include changes in for example government regulations, customer buying patterns, or a reorganization of partner's network. Dramatic changes and the threat of new ecosystems reinforce each other since new or formerly marginal business ecosystems often flourish in an altered environment. (Moore 1993) In the face of a change, the ecosystem as a whole can return to resemble a supply chain as companies protect their own and openness decreases (Gawer 2014). One of the challenges a company faces is to decide how to inhibit obsolescence. On the competitive side this includes high entry barriers to repress alternative ecosystems, and high customer switching costs to buy

time to upgrade products or services. On cooperative side the threat of obsolescence can be tackled by working with innovators and bringing new innovations into a company's ecosystem. The final option is to cope with the new reality and to fundamentally restructure a company. (Moore 1993)

2.3 Ecosystem Strategies

The challenges of leadership and self-renewal stages presented by Moore (1993) are somewhat parallel to the strategies or roles companies have in a business ecosystem. Iansiti & Levien (2004) found three viable strategies a company may pursue in an ecosystem: keystone, physical dominator and niche. An inviable strategy is value domination which drains the ecosystem dead. Additionally, they recognized commodity strategy functioning in a stable and independent environment where ecosystem strategy is practically irrelevant. The viable strategies for different parts of a company's business may vary and the strategies may change as the ecosystem changes. Adner (2012, p. 115-116, 132-133) on the other hand roughly divides companies into leaders, who are responsible for bringing the ecosystem together, and followers, who are only responsible for themselves. Furthermore Hagel (1996) uses a division between shapers and followers. Divided into adapters and shapers, the ecosystem strategies examined in the thesis are presented in Figure 3.

Both leader and dominator strategies represent what Hagel (1996) calls a shaper strategy with a company's own technology in the core leading it to dominate the market (Besen & Farrell 1994). Iansiti & Levien (2004) add a health increasing aspect arguing that an ecosystem needs members who will increase the ecosystems overall health and advance stability. Iansiti & Levien (2004) present three factors that describe an ecosystem's

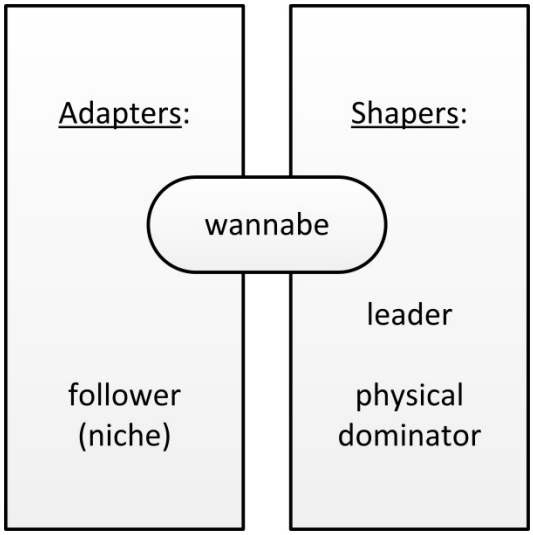


Figure 3. *Ecosystem strategies (based on Adner 2012; Hagel 1996; Iansiti & Levien 2004).*

health and determine the success of an ecosystem. First, what ultimately determines an ecosystem's survival is productivity. Productivity refers to an ecosystems ability to convert inputs into outputs which in business means the network's ability to turn technology and innovation into lower costs and new products or services. Second, an ecosystem should be robust referring to an ecosystem's ability to survive disruptions. And third, an ecosystem should embrace variety or create niches increasing the ability to absorb external shocks and to produce productive innovations. (Iansiti & Levien 2004)

Iansiti & Levien (2004) call the health increasing member a keystone but many others use the word leader to describe a similar player (Adner 2012; Gawer & Cusumano 2002; Moore 1993). In the thesis a leader is used. A leader organization both creates value and shares it with other ecosystem members. A leader also increases productivity, robustness and niche creation of an ecosystem hence improving its health. A leader does not work to improve an ecosystem's health for the sake of others but recognizes that the health of an ecosystem is reflected to its own success. Thus a leader's aim and insurance for success lays in the improvement of the ecosystem's overall health. (Iansiti & Levien 2004) However, not all parts of the leader company must work for greater good but some parts can aggressively compete in the market place seeking for profits (Gawer & Cusumano 2002, p. 130). Furthermore, a leader may gain the same advantages as a vertical integrator through knowledge of external components (Kapoor & Adner 2012). Adner (2012, p. 116-117) adds that a leader makes the initial investment and bares the initial risk to get everyone else participating while reaping rewards only in the end. For a leader's innovation to succeed, suppliers and complementors must be "on the same page" with the leader (Adner & Kapoor 2010). This is sometimes difficult as suppliers, complementors, and the focal company's innovation speeds differ (Mäkinen & Dedehayir 2013).

Gawer & Cusumano (2002) also recognize wannabes as a part of the ecosystem though this role is unwanted. Wannabes are companies that aimed for leadership but did not quite make it. Wannabes are often companies that fail to control the openness of the interfaces to their platforms thus giving away too much information or advantage to competitors. Wannabes are also companies that have too little complementing products or services available to make their platforms successful in the marketplace (Gawer & Cusumano 2002, p. 242).

The value suckers of an ecosystem are a physical dominator and a value dominator. A physical dominator integrates vertically and aims to own and manage directly as much of the value chain as it can, thus leaving little room for an actual ecosystem to emerge (Iansiti & Levien 2004). A physical dominator eventually owns most of the ecosystem (Iansiti & Levien 2004) thus mitigating contractual hazards caused by opportunistic behavior (Adner & Kapoor 2010). Eventually, a physical dominator is by itself responsible for creating value (Iansiti & Levien 2004). A value dominator on the other hand has little control over the ecosystem. A value dominator sucks as much value as it can

from the ecosystem while creating little, if any, value in return. This ultimately leads to the ecosystem to collapse which also brings down the value dominator itself (Iansiti & Levien 2004).

The third strategy is to be a follower (Adner 2012) characterized as an adaptive strategy (Besen & Farrell 1994; Hagel 1996) and an offering of complementary or otherwise compatible products or technologies (Adner 2012, p. 87; Adner & Kapoor 2010; den Hartigh & van Asseldonk 2004). Iansiti & Levien (2004) use a niche player to describe this type of a strategy consisting of leveraging the resources of other niche players and a leader allowing the niche company to focus on itself and its field of expertise. Even though these characteristics apply to followers, followers are not always niche players but include big companies focusing on the whole market as well. A follower bares a lower risk than a leader, gets to choose to participate in winning ecosystems only, and gets profits faster (Adner 2012, p. 133). Followers, especially as niche players, are numerous in many ecosystems, and answer for most of the value creation and innovation. Followers resembling niche players are easily swallowed by a dominator or played out by a leader or a rival niche player. This forces followers to carefully choose which ecosystem to be a part of (Adner 2012, p. 133-135) and to innovate actively (Iansiti & Levien 2004). Nevertheless, niche players can exert the power of many to protect themselves as there are usually hundreds if not thousands of niche players that will abandon a leader if it starts acting too domineeringly (Iansiti & Levien 2004).

3. COMPETITIVE ADVANTAGE

Competitive advantage is by no means easy to explain though its manifestations are rather visible. In this chapter competitive advantage is first defined and discussed. Secondly, its sustainability is considered and some critique towards the traditional notion of equilibrium as a determinant of sustainability is highlighted.

3.1 What is Competitive Advantage?

Competitive advantage is defined as "a condition or circumstance that puts a company in a favourable or superior business position" (Oxford Dictionaries). Another view is to describe competitive advantage as superior performance. What this superior performance is depends on the perspective. For example from population ecology perspective superior performance is survival, companies not enjoying high enough performance levels die out (Hannan & Freeman 1984). From a more customer oriented perspective competitive advantage is described as consistent production of "product [or] delivery systems with attributes which correspond to the key buying criteria for the majority of the customers in the targeted market" (Hall 1992, p. 135) and competitive advantage thus lies in the eyes of a customer (Hall 1993) and is manifested in market share. Most literature however considers superior performance in economic terms as superior financial performance. However a company's goal might not be to earn as much money as possible. In fact, companies that strive for greater things than just money are more profitable (Collins & Porras 2004, p. 33). Competitive advantage is usually presented as something companies try to achieve by default. This is nevertheless not true. There are numerous small and medium sized companies and family businesses that are perfectly content with the living they make. These often enjoy their place in the local business life.

Competitive advantage as financial performance is described as the creation of rents i.e. earnings above the breakeven point which do not induce new competition. Rents can be divided to ricardian and monopoly rents depending on the forces that enable the rents. Ricardian rents are based on scarcity of superior resources (Ricardo 1821, p. 40-42). The resources that produce a product most efficiently are first mobilized. As the demand for the product increases, inferior resources are used as well until a break-even point is achieved. In this situation, if equal quantities of capital and labor are used, superior resources are more efficient in producing the product thus giving an advantage over the inferior resources. Monopoly rents, on the other hand, are a result of a deliberate restriction in an output or end product's availability. The price of a product increases

without the fear of entry by rivals. This is the case for example in companies whose operations are protected by law, like liquor stores in Finland.

Competitive advantage has been described as an ability to produce goods or services more economically than other companies and/or better satisfy customer needs (Peteraf 1993; Porter 1985, p. 10). This enables cost savings and/or premium price and therefore rents (Porter 1985, p. 15). Peteraf & Barney (2003) further clarify the term and define competitive advantage by presenting that "[a]n enterprise has a *Competitive Advantage* if it is able to create more economic value than the marginal (breakeven) competitor in its product market." (Peteraf & Barney 2003, p. 314), economic value being the difference between received benefits gained by a customer and the economic cost to the company (Peteraf & Barney 2003). This definition is consistent with Barney's (1991) earlier definition of competitive advantage as an implementation of a value creating strategy which no current or potential competitors implement simultaneously, though Peteraf & Barney (2003) do not rule out the possibility that more than one company has competitive advantage simultaneously. However, the number of companies having significant competitive advantage should be rather small (Barney 1991). A noteworthy difference between Barney's (1991) and Peteraf & Barney's (2003) definitions of competitive advantage is that Barney's early definition emphasizes the potential competitors ready to enter the industry in the future and not only the current competitors.

In addition, the Peteraf & Barney's (2003) definition illustrate the possibility of different levels of competitive advantage to occur. There can be companies that create just a little bit more economic value than the marginal competitor as well as those that create much more. The definition however highlights the problem related to competitive advantage. It is extremely hard to define where competitive advantage comes exactly but rather easy to specify how it manifests itself. What makes the observation of competitive advantage even harder is the time span and the moment of examination. If a company has competitive advantage at this point it might not realize in economic terms until in a year or two. Likewise, superior financial performance now does not mean that a company has a competitive advantage. The company might have lost it but it just takes a while to manifest.

Peteraf & Barney (2003) further use the term competitive advantage to refer to "the relative performance of rivals in a given (product) market environment, however broadly of narrowly that market may be defined" (Peteraf & Barney 2003, p. 313). This emphasizes the notion that competitive advantage does not exist in a vacuum but in relation to competitors. Moreover the quotation points out that competitive advantage occurs in a given market hence a company may have competitive advantage in one market it operates in but not in another one.

As a conclusion, competitive advantage is a condition which enables a company to deliver more value to the customer with the same costs as its competitors or to deliver the

same value as its competitors but with lower costs. Competitive advantage can thus be described as superior performance in relation to competitors. Competitive advantage most often leads to above normal financial performance.

3.2 The Sustainability of Competitive Advantage

Another important concept is sustained, or sustainable, competitive advantage. Both are used in literature and even though there is a slight difference between sustained and sustainable they both basically refer to persistence. In this thesis the term sustainable competitive advantage is used to refer to both sustained and sustainable competitive advantage presented in literature.

Barney (1991) defines sustainable competitive advantage by adding to his definition of competitive advantage (a company implements a value creating strategy not implemented by current or potential competitors) a notion that competitors both current and potential are unable to duplicate the benefits of a value creating strategy. Sustainable competitive advantage does not thus depend upon calendar time and there is not a specific period of time that defines sustainability. Sustainability is rather achieved when competitive advantage continues to exist after efforts to duplicate the advantage have ceased and thus it depends upon current and potential competitors' inability to duplicate the value creating strategy (Barney 1991). Dierickx & Cool (1989) on the other hand consider competitive advantage sustainable when it arises from assets that are nontradeable, or difficult to imitate or substitute. It is thus the accumulated assets of a company, and not its strategy, that competitors' cannot duplicate.

Even if a competitive advantage is sustainable it does not mean that it will last forever. Sustainability only implies that competitive advantage cannot be competed away by efforts to duplicate the benefits of the competitive advantage. Unanticipated changes in the economic structure however have the power to turn the tide. Structural revolutions redefine which resources can provide competitive advantage and which are no longer valuable. (Barney 1991; 1995)

The sustainability of competitive advantage has been a subject for critique and not all take sustainability for granted. Especially the notion of equilibrium has been criticized. For example the competitive dynamics view considers competition to be hostile and disruptive i.e. an ever-changing process of actions and responses making the initial action obsolete. When a competitor can answer to an action within days or even minutes, it is impossible to attain a position that could be described as sustained (Grimm et al. 2006, p. 9-11, 21). Competitive advantage is thus seen as temporary and sustainability arises from continuous short-lived actions creating competitive advantage (D'aveni & Gunther 1994, p. 12).

Furthermore, in a highly competitive or unstable environment (D'aveni & Gunther 1994), or when innovations creating competitive advantage can be imitated (Grant 1991) every advantage is eventually eroded by a counterattack. Thus capabilities should be continuously developed to sustain competitive advantage – even when a company succeeds with its current capabilities (Grant 1991; Sirmon et al. 2010). D'aveni (1994) further notes that attempts to sustain an advantage can be described as a harvesting rather than a growth strategy. D'aveni et al. (2010) review the literature on temporary advantage and conclude that current models insufficiently explain competitive advantage in complex and fast changing environments.

4. SOURCES OF COMPETITIVE ADVANTAGE

Researchers have tried for years to explain where competitive advantage stems from. Explanations vary from industry to customer value but the ultimate source of competitive advantage remains hidden – if exists at all. The following section briefly presents the research conducted in this area and demonstrates the multitude of possible sources for competitive advantage. The second section focuses on one of the dominating perspectives to competitive advantage – the resource-based view. The resource-based view covers a company's resources and capabilities, and many of the more specific sources of competitive advantage presented in the first section of this chapter can be placed under the umbrella of the resource-based view.

4.1 An Overview of the Literature

Industrial organization economics and the structure-conduct-performance framework provide an environment dependent view to competitive advantage. Porter is one of the most famous researchers in the field. He argues that some industries enable greater profits than others due to industry characteristics and a company can gain competitive advantage by selecting to operate in the "right" industry (Porter 1980, p. 3-5) using a strategy suitable for industry characteristics (Porter 1985, p. 24-25). Porter (1980, p. 4) names five characteristics or forces which determine the attractiveness of an industry: industry competition, potential entrants, substitutes, suppliers, and buyers. The underlying assumption is that all the actors mentioned compete with the company for profits which is quite the opposite to the previously presented business ecosystem view. The most attractive industries are those whose structure limits the profit reaping power of actors other than the company. From Porter's point of view, the environment i.e. the industry largely determines competitive advantage. Also the business ecosystem perspective to the environment emphasizes the important role of external factors. However, the business ecosystem perspective considers connections between companies to be both competitive and cooperative (Moore 1993) whereas Porter only acknowledges competitive connections. As such, the ecosystem perspective better describes reality.

Competitive dynamics view draws from game theory and considers competitive advantage in relation to constant change focusing on action/response dyad between companies. Grimm et al. (2006) argue that globalization, technological change, and privatization and deregulation have increased the pace of competition (Grimm et al. 2006, p. 14-20). This has led to an urge to conduct competitive actions more frequently and to respond to rivals' actions faster. A company's performance increases as its competitive

activity increase but competitive activity also encourages reactions from competitors (Young et al. 1996). By conducting competitor analysis (Chen 1996) it is possible to anticipate rivals' actions and responses which leads to a better performance.

More recently Collins (2001) and Collins & Porras (2004) argued that excellent performance is not achieved by trying to build strategies or courses of action. Instead, they are to be changed according to changes in the environment while a company's core values and the reason to exist remain unchanged. The company therefore preserves its core but secures progress by experimenting a lot and keeping only the good things.

The sources of competitive advantage presented from now on boil down to two factors: what the organization has access to and what the organization is capable of doing. These two, resources and capabilities respectively, place the foundation for a wider perspective, namely the resource-based view discussed in the following chapter.

Barney (1986a) presents that competitive advantage can only arise when a company has exceptional information or it is lucky. Competitive advantage thus is not always gained due to managerial excellence or informed decisions, but it can be a manifestation of a good fortune. Hao (2002) has further examined the role of luck as a determinant of competitive advantage. He presents a typology depending on weather luck is sought actively or not, and weather the source of luck is endogenous or exogenous. Exogenous sources providing competitive advantage are for example asymmetric information, change in technology and a faltering competitor. Endogenous processes enhancing luck and competitive advantage are for example those which encourage bold experimenting, foster initiatives, and create a hotbed for innovation.

Organizational culture has been suggested to be a source of competitive advantage. According to Barney (1986b) organizational culture can be a source of competitive advantage only if it is valuable, rare and imperfectly imitable. However, organizational culture alone cannot ensure superior performance, but other strategically relevant functions must be managed successfully as well (Peters & Waterman 1982, p. 13-17). An additional problem related to organizational culture as a source of competitive advantage arises from normative limitations. Guidelines for less successful companies to modify their cultures and thus gain competitive advantage cannot be given by studying the cultures of successful companies (Barney 1986b). A company either has or has not an organizational culture creating competitive advantage but it cannot be created in retrospect.

Also the role of total quality management as a source of competitive advantage has been examined. Powell (1995) argues that it is generally not possible to gain competitive advantage through tools and techniques associated with quality management. These include features such as quality training, and benchmarking. Nevertheless, competitive advantage can be gained through certain tacit, behavioral, imperfectly imitable features.

These include for example open culture, employee empowerment, and executive commitment. (Powell 1995)

Some researchers suggest that quality improvements are not enough and the source of competitive advantage is found from more outward orientation towards customers. Woodruff (1997) presents a customer value orientation approach to balance internal and external focus on customer value. He argues that competitive advantage is created through better understanding and meeting a customer's desired value as well as quick responses to changes in customer-desired value (Woodruff 1997). Hinterhuber & Liozu (2014) alternatively believe that customer satisfaction can be improved using innovative pricing strategies which also increase company profits. Innovations in pricing break the win/lose proposition between a company and its customer and thus creates competitive advantage (Hinterhuber & Liozu 2014). In addition the right price is needed to capture potential rents. Dutta et al. (2003) considers price-setting to be a capability which enables value appropriation and further emphasize the need for balancing resource allocation between value creation and extraction.

A more cognitive perspective (see e.g. Kaplan 2011 for a review) has also been presented. Cockburn et al. (2000) argue that the underlying reason for company heterogeneity, and hence competitive advantage, is managers' ability to interpret external and internal signals in a way that the company has earlier or more favorable access to resources, markets or organizational opportunities. Similarly, the way a top management team thinks about a company's competitive environment affects the decisions about market positioning, competitive actions, and the like, hence affecting the company's performance (Porac et al. 1989). In addition to the cognitive base of the top management, also the characteristics, like age, career experience and socioeconomic roots, of top managers affects their strategic choices and hence company performance (Hambrick & Mason 1984). The top management team can thus be a source of competitive advantage.

Building on the framework of knowledge reservoirs Argote & Ingram (2000) argue that competitive advantage can be created by transferring knowledge internally while preventing external transfer to competitors. Knowledge transfer refers to the process through which a group, a department, or a division is affected by the experience of another group, department, or division. Knowledge transfer takes place between organizations' members, tools, tasks, and the subnetworks these elements form. Compatibility between network elements and networks determines what an organization can do, and how effectively, hence determining its performance and profitability. Furthermore, embedding knowledge into networks including people makes it harder for rivals to transfer or copy that knowledge (Argote & Ingram 2000) resulting in sustainability. Organizational knowledge creation is also rooted in people and social capital, i.e. network structures, shared language, norms, and trust, which determine how effectively knowledge is exchanged and combined (Nahapiet & Ghosal 1998).

More recently the uncertainty caused by globalization, new technologies, and greater transparency has been tackled by suggesting that competitive advantage in an unstable environment arises from adaptability (Reeves & Deimler 2011). Reeves & Deimler (2011) and D'aveni et al. (2010) argue that in the highly dynamic competitive environment the traditional sources of sustainable competitive advantage (i.e. positioning and resources) no longer apply. Instead a company can gain competitive advantage through the ability to adapt rapidly, a view closely related to competitive dynamics.

Reeves & Deimler (2011) also recognize the ability to read and act on external signals as a source of competitive advantage. The analysis of an environment has traditionally been rejected as a source of competitive advantage (Barney 1986a). Nevertheless there seems to be some evidence suggesting that companies act purposefully in response to internal and external environmental cues which allows a company "lagging behind" to catch up (Cockburn et al. 2000).

In addition, a relational view has been offered. Dyer & Singh (1998) focus on "…dyad/network routines and processes as an important unit of analysis for understanding competitive advantage." (Dyer & Singh 1998, p. 661). Concentrating on allied companies, they found the sources of competitive advantage to be interfirm knowledge-sharing routines, complementary resource endowments, and effective governance. Competitive advantage is sustained due to network-level barriers to imitation e.g. inter-organizational asset connectedness and partner scarcity.

4.2 The Resource-Based View

One of the most dominant perspectives to competitive advantage is the resource-based view. The view pays attention on individual companies rather than on products or industries as a whole and focuses on the insides of a company (Wernerfelt 1984). The resource-based view thus rather investigates how companies, and especially their resources, differ from one another. Wernerfelt (1984) was among the first ones to present that companies should be examines in terms of their resources and capabilities needed to produce products. A company must identify company resources and capabilities relative to competitors and select a strategy which best exploits these resources and capabilities relative to external opportunities (Grant 1991). The principal train of thought is that superior resources enable lower costs or higher benefits thus delivering greater value. Greater value means more economic value which is a manifestation of competitive advantage.

The resource-based view has suffered some terminological confusion as researchers have tried to bring about all the subtle differences between the terms related to the view. The slightly overlapping terms used are resources (e.g. Amit & Schoemaker 1993; Barney 1991), capabilities (Hall 1993), dynamic capabilities (Teece et al. 1997), competencies (Cockburn et al. 2000; Hall 1992), and core competencies (Prahalad & Hamel

1990). In this thesis the terms resources and capabilities are used as they are the most commonly used and have established a strong position in mainstream literature.

The prevailing notion is to use the terms resource and capability to describe "having" and "doing" aspects of a company respectively. A resource is a tangible or intangible asset or input to production (Grant 1991; Helfat 2003, p. 1) that is converted into a final product or service by using for example technology, information systems, trust between management and labor, and so on (Amit & Schoemaker 1993). Furthermore an organizational resource in an asset or input the organization owns, controls, or has access to on a semi-permanent basis (Amit & Schoemaker 1993; Helfat 2003, p. 1). Barney (1991) argues that company attributes are called resources only when they exploit external opportunities or neutralize external threats i.e. are valuable. Others (e.g. Wernerfelt 1984) have however discusses resources as both strengths and weaknesses. Additionally, both strengths and weaknesses are proven to affect company performance (Arend 2008; Sirmon et al. 2010). As a conclusion, the term resource is used to refer to a tangible or intangible input the company has a semi-permanent access to regardless of the resource's value.

Even though a capability is sometimes referred to as a part of resources (e.g. Clemons & Row 1991; Hall 1992) an organizational capability more often refers to the utilization or deployment of organizational resources in combination – an ability to perform a coordinated task in order to achieve a particular end result (Amit & Schoemaker 1993; Grant 1991; Helfat 2003). Capabilities are tangible or intangible processes, and based on developing, carrying, and exchanging information (Amit & Schoemaker 1993). Collis (1994) has divided the prior definitions of a capability into three categories depending on whether the definition describes an activity that is static, dynamic, or creative. This emphasizes the multitude of definitions. Collis (1994) himself defines organizational capabilities as "the socially complex routines that determine the efficiency with which firms physically transform inputs into outputs" (Collis 1994, p. 145).

Intangible resources are further classified as assets or skills depending on if they can be owned or can belong to someone, and hence are legally protectable, or if they are not owned nor legally protectable, like knowhow and culture (Hall 1992; 1993). The main difference between Helfat (2003) and Hall (1992; 1993) is that Helfat makes the distinction between passive resources and active capabilities from the start whereas Hall considers skills aka capabilities to be a part of resources.

Besides classifying resources into tangibles and intangibles, several typologies have been suggested. Barney (1991) presents three categories for classification: physical capital resources, human capital resources, and organizational capital resources. Grant (2002, p. 140, in; Grimm et al. 2006) classifies tangible resources into financial resources and physical resources. He further classifies intangibles into technological resources and reputation, and adds human resources as a third category (Grimm et al.

2006, p. 72-73). The categories together with example resources they include are collected in Table 1.

At times resources and capabilities have more value when used in conjunction with another resource or capability than without it. If this is the case, the resources or capabilities are said to be complementary (Teece 1986 in; Clemons & Row 1991). For example a production process with sophisticated optimization software has more value than a process without optimization software and advanced machine tools create more value when used by educated employees than when used by uneducated ones.

As for interconnected companies, the competitive advantage is not only accredited to resources owned or controlled by the companies alone or the capabilities of individual companies but to the relationship as relational rents. Relational rents refer to the quasi-rents created in alliances by "idiosyncratic interfirm linkages" (Dyer & Singh 1998, p. 661) and rents which are appropriated using shared and co-created resources (Lavie 2006). Relational rents are affected by relation-specific investments, alliance partners' knowledge-sharing routines, complementary resources and capabilities, and effective governance (Dyer & Singh 1998). Even though shared resources enable relational rents, on top of the rents created by unshared internal resources, alliance partners must be careful not to let internal rents to spillover to partners (Lavie 2006).

Table 1. *The typology of resources (Barney 1991).*

Category	**Examples**	**Source**
Physical resources	technology, plant and equipment, geographic location, access to raw materials	(Barney 1991; Grant 1991; Grant 2002, p. 140, in; Grimm et al. 2006),
Human resources	training, experience, intelligence, adaptability, relationships of managers and workers	(Barney 1991; Grant 1991; Grant 2002, p. 140, in; Grimm et al. 2006)
Organizational resources	formal reporting, formal and informal planning and controlling systems, informal relations among internal and external shareholders	(Barney 1991; Grant 1991)
Financial resources	borrowing capacity, internal funds generation	(Grant 1991; Grant 2002 , p. 140, in; Grimm et al. 2006)
Technological resources	patents, trade secrets, research facilities, technical and scientific employees	(Grant 1991; Grant 2002 , p. 140, in; Grimm et al. 2006)
Reputation	brands, trademarks, relationships with customers, suppliers, government and community	(Grant 1991; Grant 2002 , p. 140, in; Grimm et al. 2006)

A common misunderstanding regarding the resource-based view is that resources and capabilities, or their configurations (Gruber et al. 2010), create competitive advantage by themselves. It is however managers who must "identify, develop, protect, and deploy [them] in a way that provides the firm with a sustainable competitive advantage" (Amit & Schoemaker 1993, p. 33). In other words resources and capabilities create no competitive advantage unless employed appropriately.

4.2.1 Prerequisites for Competitive Advantage

In order to competitive advantage to arise, certain theoretical conditions must be met. Peteraf (1993) presents that no sustained competitive advantage can arise unless companies are heterogeneous, resources are imperfectly mobile and both *ex ante* and *ex post* limits to competition exist. Simply put, the conditions must be such that the costs of acquisition of competitive advantage enabling resources are less than the expected benefits (Barney 1986a).

Heterogeneity refers to different resources and capabilities companies possess and is a condition for different levels of performance. If all companies are homogeneous there obviously will not be successful and less successful companies. As some companies are more efficient than others, they are able to earn above-normal returns. (Barney 1991; Peteraf 1993)

If resources are to create sustainable competitive advantage, they must not be easily bid away from the company. Only if a resource remains bound to the company can it be used as a differentiator for an extended period of time (Barney 1991). Resources bound to a company are immobile or imperfectly mobile (Grant 1991; Peteraf 1993). Immobile resources are resources which cannot be traded. Dierickx & Cool (1989) characterize these resources as accumulated or "built" and highly company specific, e.g. trust and reputation. Imperfect mobility refers to resources which are somewhat specialized to company specific needs. Thus they are more valuable to the company currently employing them than they would be in another company's employ (Peteraf 1993). Imperfect mobility may simply rise from exceedingly high transaction costs (Williamson 1973) or co-specialization (Teece 1986 in; Clemons & Row 1991).

Furthermore, rents can only be created when limits prior to any company gaining a superior position exist. These limits ensure that rents are not offset by competition. Barney (1986a) argues in his work about strategic factor markets (markets for resources needed to implement a strategy) that the economic performance of a company depends on both the returns of strategies and the cost of implementing those strategies. The rents created by a resource are competed away unless strategic factor markets are imperfect i.e. companies have different expectations about the value of a resource. In this regard companies who have more accurate expectations of the future or are lucky gain returns greater that the cost of resources needed to implement a strategy.

Finally, heterogeneity can only bring durable value if it is preserved. Hence there must be forces that limit competition for the rents after certain comanies have gained a superior position and earned rents. Competition may decrease rents by adding to the supply of scarce resources as well as by increasing output. Two critical limits to competition are imperfect imitability and imperfect substitutability. (Peteraf 1993)

4.2.2 The VRIO Framework

The resource-based view is prescriptive in a sense that it describes which characteristics a resource must have in order to generate and sustain competitive advantage and hence superior performance. The prevailing notion states that a resource generating sustainable competitive advantage must be valuable, rare, inimitable, and organizationally fit (Barney 1986b; 1991; 1995; Barney 1997, p. 145; Barney & Clark 2007; Crook et al. 2008). These characteristics and their effect on competitiveness and economic performance are presented in Table 2.

If a resource is not valuable it potentially cannot generate economic rents. A resource is valuable when it "enables a company to respond to environmental threats or opportunities" (Barney & Clark 2007, p. 70) in a way that neutralizes threats or exploits opportunities (Barney 1995). A resource is also valuable when is enables the company to create or implement strategies which improve efficiency and effectiveness (Barney 1991) for the company that possesses it. An invaluable resource decreases efficiency and effectiveness and thus becomes a burden leading to a competitive disadvantage. A resource being valuable but present in most companies offers normal performance (Barney 1991). These resources set a company "on the same page" with the others and thus enables competitive parity. Valuable but common resources bringing competitive parity are by no means to be diminished (Barney 1991; 1995). There resources often relate to eve-

Table 2. *The VRIO framework (Barney 1997, p. 163; Barney & Clark 2007, p. 70).*

Is a resource or capability…					
Valuable?	Rare?	Costly to imitate?	Exploited by organization?	Competitive implications	Economic performance
No	-	-	No	Competitive disadvantage	Below normal
Yes	No	-	↑↓	Competitive parity	Normal
Yes	Yes	No		Temporary competitive advantage	Above normal
Yes	Yes	Yes	Yes	Sustained competitive advantage	Above normal

ryday tasks of a company and may present the resources a company cannot function without e.g. managerial talent, administration and social skills.

A resource that's valuable and rare has a potential to create competitive advantage. There is no unambiguous explanation to rareness of a resource even though Barney (1991) presents that a valuable resource can be a source of competitive advantage as long as the companies possessing the resource are fewer than what is needed to generate perfect competition. Competitive advantage enabled by valuable and rare resources can only be temporary describing first mover advantage (Barney 1991). The reason for this is that there are no limits for the benefits of the resources to spread. If nothing prevents other companies from imitating or copying the resource, it soon becomes a commodity. As the resource becomes more common it no longer provides competitive advantage but only competitive parity and thus normal economic performance.

A resource that is valuable, rare and costly to imitate or substitute potentially provides sustainable economic performance (Barney 1991). Costly imitation or substitution ensures that the resource remains available to few companies only. Costly imitation arises from for example a combination of multiple resources (Grant 1991), social complexity (Barney 1986b), causal ambiguity (Dierickx & Cool 1989; Reed & DeFillippi 1990), history (Barney 1995), asset mass effect and interconnectedness (Dierickx & Cool 1989).

Imitation and substitution does not concern just the resource itself but the benefits it creates or the strategies it enables (Barney 1991). Thus a substitute might be far different from the original resource or capability merely offering the same function and benefits as the original one. Additionally, costly to imitate and substitute implies that the benefits are not necessarily impossible to imitate or substitute but rather the costs, in terms of time, money and effort, eat away the benefits (Barney 1995). It might for example take years for a company to develop a certain resource without certainty that the resource will create competitive advantage once achieved.

A resource being valuable, rare and costly to imitate merely has the potential to provide sustainable competitive advantage. In fact, if it provides competitive advantage at all is determined by the fit between the resource and the organization possessing it since complementary resources are needed to unlock the competitive advantage creation potential (Barney 1995). Even though a company possesses a resource enabling competitive advantage but is not arranged to exploit it, or is not motivated to do so, the resource is of little use. Eventually, resources and capabilities must be used accordingly to implement strategies in order to free their competitive advantage creating potential – mere possession is not enough.

Additionally, resources which at some point in time help create sustainable competitive advantage will not do so forever. Intensifying competition and severe changes in a

company's environment may make a previously valuable resource irrelevant, or remove the limits for imitation. Thus resources and capabilities creating competitive advantage have a limited time frame which in many areas is getting shorter and shorter (D'aveni & Gunther 1994, p. 11)

4.2.3 The Importance of Capabilities

Capabilities provide a more sustainable source of competitive advantage than resources as they are maintained even though resources are replaced (Grant 1991) and they are harder to imitate than resources (Barney 1991). Furthermore capabilities that relate to learning i.e. dynamic capabilities enable companies to overcome inhibitors to imitation as well as to adapt to changing circumstances (Teece 2007; Teece et al. 1997). Recent empirical studies have also implied that tangible resources, intangible resources, and capabilities play a role of unequal importance with regard to sources of sustainable competitive advantage (Fahy 2002; Galbreath 2005).

Both Fahy (2002) and Galbreath (2005) formulate a hypothesis according to which company specific intangible resources are more important in creating sustainable competitive advantage than company specific tangible resources and furthermore, capabilities are more important than intangible or tangible resources. According to the studies, capabilities do play a more important role in creating sustainable competitive advantage but the results regarding intangible and tangible resources are somewhat conflicting. Fahy (2002) presents that company specific tangible resources are more important than intangible ones in a global environment whereas Galbreath (2005) suggests that tangible resources are only more important than intellectual property rights but less important than organizational and reputational resources. This difference might stem from Fahy's (2002, p. 63) choice to cover intangible resources in a one bundle compared to Galbreath's (2005) three categories.

Despite the slight differences in the results of Fahy (2002) and Galbreath's (2005) studies, it can be concluded that capabilities are the most important source of sustainable competitive advantage. Furthermore intangible resources are not always more important than tangible resources (Galbreath 2005) as traditionally presented in resource-based view and justified by tangible resources' availability in the markets and relatively easy imitation.

Teece et al (1997) present the dynamic capabilities framework to describe organizational learning. He defines dynamic capabilities as a company's "ability to integrate, build and reconfigure internal and external" capabilities used to adapt to a changing environment (Teece et al. 1997, p. 516). Dynamic capabilities represent higher-order capabilities that alter and integrate lower-level capabilities and resources in order to implement new value-crating processes and strategies (Grant 1996; Pisano 1994; Teece 2007) and therefore their value lies in the resources they create, not in the capabilities themselves

(Eisenhardt & Martin 2000). Dynamic capabilities are for example strategic decision making, product development, alliancing (Eisenhardt & Martin 2000), rapid experimenting (Reeves & Deimler 2011), and process development (Pisano 1994).

Collis (1994) suggests that dynamic capabilities can be used to overcome circumstances inhibiting imitation, such as time compression diseconomies, asset mass economies and interconnectedness constraints related to lower-order capabilities. He however points out that any resource or capability that currently creates competitive advantage developed due to former capabilities which in turn developed due to former capabilities and so on *ad infinitum*. This implies that capabilities are not the Holy Grail of competitive advantage hence challenging Fahy (2002) and Galbreath (2005). Collis (1994) argues that "although the sources of sustainable competitive advantage can be found in any of the – very large – number of levels, valuable capabilities are dependent on the context of the industry and the time."

Dynamic capabilities, and resources and capabilities alike, have lifecycles very similar to product lifecycles (Helfat & Peteraf 2003) characterized by a growth path (Wernerfelt 1984). Helfat & Peteraf (2003) argue all capabilities to have a potential to accommodate to change without dynamic capabilities as intermediaries. In fact, dynamic capabilities face a lifecycle of their own (Helfat & Peteraf 2003). In its lifecycle a capability may extend beyond companies, product, and industries in which it originally founded, developed, and matured (Helfat & Peteraf 2003).

5. RESOURCES AND CAPABILITIES IN BUSINESS ECOSYSTEMS

It remains unambiguously explained if competitive advantage can stem from the analysis of external signals since arguments both against (e.g. Barney 1986a) and for (Cockburn et al. 2000; Reeves & Deimler 2011) have been presented. The resource-based view urges to look inside the company for sources of competitive advantage whereas ecosystem perspective suggest quite the opposite, namely to pay attention to the network a company is embedded in in search for superior performance (Iansiti & Levien 2004). In this chapter an attempt is made to connect these two perspectives and to form a framework that provides concrete implications as for which resources are the most likely sources of competitive advantage in different stages of an ecosystem depending on the strategy of a company. A leading thought is that companies in an ecosystem do not compete on clearly defined products but on solutions and rather than limiting its focus on a product market a company should ask what it can do for its ecosystem.

Five ecosystem strategies were recognized in the literature: leader, value dominator, physical dominator, niche, and commodity. Of these, value dominator decreases the health of an ecosystem eventually destroying it. In addition, a commodity business characterized by mature and stable environment and high independently falls out of the ecosystem scope. Therefore value dominator and commodity strategies are not discussed.

5.1 Strategy Independent Resources and Capabilities

Competitive advantage is mainly created through capabilities and intangible resources (Fahy 2002; Galbreath 2005). Following these thoughts the resources and capabilities creating competitive advantage regardless of a company's strategy in a business ecosystem are identified to be luck, a top management team, organizational culture, reputation, rapid adaptation, shared resources, and the ecosystem itself in which the company is locked into.

At a business ecosystem's birth stage a leader, a physical dominator, and a follower must choose a seed innovation around which to start building a network. This is by no means easy. Considering the seed innovation that will be successful in the future, a strategic factor either insight or luck is needed (Barney 1986a). As *luck* is an unexpected occurrence of a positive event, there are little resources or capabilities to do with it. But insight, as exceptionally accurate expectations about the future, is something that can be

achieved, at least to some extent, by *the top management team* (Cockburn et al. 2000). The selection of a "right" seed innovation can merely provide temporary competitive advantage though, if the selection is not followed by an exploitation of scarce resources like access to raw materials or locking in scarce suppliers. If resources needed to benefit from a seed innovation are common and readily available, other companies can soon catch up with the first mover.

Organizational culture can provide competitive advantage through all the stages of an ecosystem and for companies in all roles through favorable routines and capabilities and their maintenance (Grant 1991). Organizational culture can for example support the creation of relational rents (Dyer & Singh 1998). In the renewal stage especially, an organizational culture that promotes change and flexibility can be vital and ensure survival while rivals face death. Since a company without an organizational culture creating sustainable competitive advantage cannot change its culture to gain the advantage (Barney 1986b) and an organizational culture is a reflection of the circumstances of the founding of a company (Pettigrew 1979) and its growth (Clark 1972), special attention must be paid to organizational culture in the birth and expansion stages of the ecosystem. Failures in building a culture that provides competitive advantage are not to be easily fixed later on.

Reputation or brand (Hall 1993) likewise provides competitive advantage regardless of the stage of an ecosystem or a company's role. A good reputation helps a leader to lock in key suppliers and customers. By building a rigid network a leader increases the likelihood of survival as rival ecosystems are strangled and emerging ecosystems suppressed. As for the physical dominator reputation of network members it owns or controls is equally important as the reputation of the dominator itself. This is because the physical dominator and its close network have to create most if not all the value themselves and reputation of any one members helps. A strong reputation of a follower makes it a preferable partner in the ecosystem. It can however turn against the follower if a physical dominator works to swallow it in order to gain its reputation or if a leader becomes jealous or feels threatened thinking that the follower aims to be a new leader it the same or rival ecosystem. In manufacturing environment, tacit aspects of total quality management can provide competitive advantage by enhancing reputation especially in expansion and leadership stages. Reputation can however become a burden at the renewal stage as companies seek to redefine themselves.

As the ecosystem reaches the leadership stage and things fall into place it would be important for companies in all the roles to avoid too much inertia. Inertia makes a company's structures rigid and restricts change (Hannan & Freeman 1984). This makes it harder to adapt to changes in the renewal stage and thus diminishes chances of survival. *Rapid adaptation* (Reeves & Deimler 2011) on the contrary can prove to be a source of competitive advantage especially when adaptation is incorporated in a way that preserves the core values of the company (Collins & Porras 2004). As for the renewal

stage, conscious avoidance of the paradox of success is a capability offering competitive advantage. The paradox of success describes how a successful organization plants the seeds of future decline by following strategies proved effective in the past while losing the ability to recognize when external changes demand radical changes in strategy (Audia et al. 2000). The capability to avoid the paradox of success can be achieved by a top management team or appropriate organizational routines. Both must encourage willingness to adapt to changes, information seeking from unfavorable sources and critics, and redefinition of performance and goals (Audia et al. 2000).

The resource-based view emphasizes that competitive advantage is created using resources that are owned or controlled by a single company (Amit & Schoemaker 1993; Barney 1991; Wernerfelt 1984). However, from the ecosystem perspective a company's success heavily depends on the success of the network it is embedded in. Thus attention should also be paid to *resources companies share or create together* rather than looking strictly at the resources within a single company. Even though literature focuses on alliances (Dyer & Singh 1998; Gulati 1999), much also applies to business ecosystems. For example resources in both alliances and business ecosystems are more valuable, rare and difficult to imitate when they are combined (Dyer & Singh 1998). Additionally, resources and capabilities in a network coevolve (Gulati 1999) and may become indivisible (Dyer & Singh 1998). All in all attention should be paid to purposely sharing resources and capabilities as they can create competitive advantage that is sustainable.

A business ecosystem network develops during the birth and expansion stages and rival ecosystems exist. As one ecosystem wins the battle for dominance others die or wither to marginal. Companies belonging to an ecosystem share its fate and a U-turn from a dying ecosystem into a viable one might be hard. Additionally the ecosystem and its routines define resources sharing routines indirectly affecting competitive advantage through shared resources. Since belonging to a certain network locks a company into and out of certain choices, the network itself can have a severe impact on performance (Gulati et al. 2000).

5.2 Leader

A leader's aim is to ensure an ecosystem's survival and to improve its overall health by sharing value to ecosystem members (Iansiti & Levien 2004). In order to do so a leader requires careful knowledge transfer, intelligent pricing capability, network building capabilities, network readiness, understanding of risks, and appropriate network control.

During the birth stage of a business ecosystem a leader must protect the chosen seed innovation and ideas around it (Moore 1993). This calls for a carefully controlled *knowledge transfer* inside the leader company while avoiding inappropriate knowledge transfer outside the company (Argote & Ingram 2000) and outside the ecosystem just

about to emerge. This enables the leader to define a value proposition around the seed innovation and keeping it rare.

As a part of the value proposition, pricing must also be taken into account. *Pricing* must share value to the ecosystem ensuring a wide and healthy ecosystem (Iansiti & Levien 2004). Breaking the win/lose arrangement in pricing eventually increases profits and customer satisfaction (Hinterhuber & Liozu 2014) assisting the ecosystem's dominance. Pricing should be considered as a source of competitive advantage (Dutta et al. 2003) in all the stages of an ecosystem.

A leader must, from the very beginning of an ecosystem, start *building its network* of suppliers and customers etc. (Moore 1993). Even though networks are considered to consist of companies, it is eventually people who connect. Personal and professional connections and the existing networks of the top management team may thus play a crucial role during the first steps of an ecosystem.

As the ecosystem moves towards the expansion stage the new offering is communicated and delivered to the large market. Vital to a leader's success is the ability to ensure that the whole *network is ready for the expansion* on behalf of both suppliers and complementors (Adner & Kapoor 2010). A leader's core product or service cannot succeed unless all the supplier's components and complementing products and services are in place and the entirety of the offer is at the same level (Adner 2012, p. 149-150). Thus competitive advantage may arise from the ability to rid R&D of "the sooner the better" way of thinking as well as sharing of resources that ensure the networks readiness (Adner 2006).

Carefully taking the whole ecosystem into account may provide competitive advantage in terms of more accurate evaluation of the future and especially of *the network risks* related to co-innovation, execution, and adoption (Adner 2006). More accurate performance expectations are among the most fundamental sources of competitive advantage (Barney 1986a). More accurate expectations about the future can be based on recognition of differing innovation speeds among ecosystem members allowing for bottlenecks to be identified (Mäkinen & Dedehayir 2013). Furthermore expectations about future risks affect not only the leader but the whole ecosystem as the ecosystem with more accurate expectations is better prepared for future than a rival ecosystem with poor or biased expectations.

In expansion and leadership stages of an ecosystem, crucial capabilities are related to *managing a broad and complex network* in which network members are linked to one another through sometimes long and branched chains of connections. Simplifying connections increases the ecosystem's productivity (Iansiti & Levien 2004). This can be achieved using IT-systems. Even though IT-systems *per se* hardly create competitive advantage (Powell & Dent-Micallef 1997) they enable knowledge sharing and manage-

ment which can enhance other operations therefore leveraging the creation of competitive advantage (Clemons & Row 1991). Consider for example IKEA (Normann & Ramírez 1993) or Wal-Mart (Iansiti & Levien 2004).

5.3 Physical Dominator

A physical dominator seeks to control or own much of the ecosystem directly (Iansiti & Levien 2004). In order to do so a physical dominator requires financial resources, network management, and low inertia.

For the physical dominator it would, naturally, be difficult to acquire ownership or control of most of the ecosystem without *financial resources* because acquisitions and investments must be made. Financial resources are both external and internal, such as credit facility and internal fund generation.

For ownership and control of the ecosystem, a physical dominator required capabilities to *manage this wide network*. IT-systems can provide tools for integrating and coordinating activities (Clemons & Row 1991) allowing the dominator to benefit from complementary resources. Similarly, in order to control the ecosystem and its actions, versatile know-how is needed.

As a physical dominator is more or less solely responsible for value creation and a meaningful ecosystem hardly develops, the physical dominator faces rival ecosystems on its own. Historically a physical dominator has lost to ecosystems with higher levels of innovation and flexibility (Iansiti & Levien 2004). Thus it would be important not to let *too much inertia* take root in the organization as the environment stabilizes in the leadership stage. Low amounts of inertia increase the likelihood of survival in the renewal stage as the organization most likely must change.

5.4 Follower

A follower often aims to differentiate itself from other companies in the ecosystem by developing specialized capabilities in a narrow domain of expertise (Iansiti & Levien 2004). Thus competitive advantage is created through innovating more effectively than competitors, knowledge transfer, R&D resources and capabilities, innovation management, relationships to other followers in the ecosystem, and the position in the network.

A follower relies heavily on *innovating* in expansion, leadership and renewal stages. Competitive advantage can thus lie in the innovation and new product development process (Machado et al. 2014). Product development process which is based on openness, shared purpose and knowledge sharing is claimed to be more efficient, productive and effective (Machado et al. 2014). Also controlled *knowledge transfer* inside the company without leakages outside proves crucial in protecting new innovation areas as

well as the details of existing ones. However, continuous innovating and transformation has the potential to exhaust a follower (D'aveni et al. 2010).

R&D resources and capabilities required to innovate and specialize are best described as an accumulated stock of capabilities (Dierickx & Cool 1989). As such, R&D resources and capabilities must be built with time and patience. Thus creating an innovating company, which will succeed in the leadership stage, R&D accumulation should begin already before the leadership stage. As the ecosystem more or less stabilizes in the leadership stage, new entrants arrive in the niche sector and competition intensifies (Moore 1993). If a follower wakes up at this point, it is already too late. An effective R&D cannot be build overnight.

Gaining advantage from an innovation is not as easy as often presented (Clemons & Row 1991). Followers must be careful in *managing their innovations* and not to let a leader or a physical dominator steal away the value. In order to protect themselves from too dominating behavior of a leader, followers can exert the power of many as they make up most of the ecosystem and its value. For this safety precaution to be available a follower must have *good relationships to other followers* in the ecosystem even though some are its competitors while others are accomplices. The ability to exert the power of many provides competitive advantage in the sense that it neutralizes an external threat.

Similarly a follower's *position in the business ecosystem* affects its success and underlays competitive advantage. A more central position in the network enables superior returns because the position ensures access to better information and opportunities (Gulati et al. 2000). Better information in turn enhances more accurate expectations and enables earlier access to favorable resources. This combined with the possibility to affect the value proposition in the birth stage is a valuable source of competitive advantage. Furthermore, a follower's limited ability to affect the ecosystem's behavior later on makes the position in the network even more important.

5.5 Summary

Companies can less and less rely on just their own resources and capabilities to build superior performance and competitive advantage in the modern world. Based on the previous chapters, resources and capabilities creating competitive advantage in different stages of a business ecosystem and for companies pursuing different ecosystem strategies are summarized in Table 3. Just as the boundaries of the stages are not clear, the importance of a resource in a certain phase is blurred with stages next to it.

Table 3 draws a picture of companies distinct in nature. Leader is arranged towards building and managing the network and its capabilities to perform specific tasks are of little consideration. Also resources and capabilities that would directly contribute to value sharing are missing. A physical dominator is mainly oriented to divide and rule so

to speak while getting ready for rival ecosystem's emergence. A physical dominator's network management slightly differs from that of a leader as a dominator pull the strings more tightly. Followers are innovation oriented and have a somewhat underdog position.

Table 3. *Resources and capabilities in business ecosystems.*

	Birth	Expansion	Leadership	Renewal
Strategy Independent	Top Management Team			
	Organizational Culture			
	Shared Resources			
	Reputation			
	Luck			Luck
		Network		
			Rapid adaptation	
Leader	Pricing			
	Understanding of the network risk			
	Knowledge transfer			
	Network Building			
		Network Management		
		Network readiness		
Physical Dominator	Financial Resources			
		Network Management		
			Low Inertia	
Follower	Innovation process			
	Innovation management			
	Position in the Network			
		R&D resources		
		Knowledge transfer		
		Relationships to other Followers		

In an ecosystem companies depend on one another and evolve hand in hand. As the ecosystem forms around a seed innovation the resources of member companies are likely to become to some extent co-specialized i.e. they have only little value without the innovation (Teece 1986 in; Clemons & Row 1991). Thus companies develop their resources and capabilities to make them even more suitable to the ecosystem leading to increased resource complementarity (Powell & Dent-Micallef 1997). In order for the ecosystem to succeed it must as a whole be ready for the innovation introduction (Adner 2012, p. 140, 149) and the subsequently expansion. A leader must motivate the followers to participate for complementing the offer (Adner 2012, p. 117) and hence to exposure their resources to complementarity.

Building on Collins (2001) and Collins & Porras (2004), any company's superior performance is culminated in keeping the core values and the reason to exist intact. Everything else is to be changed together with the ecosystem changes. This will allow a company to thrive in the expansion and leadership stages as well as to survive renewal of its ecosystem.

6. RESEARCH DESIGN

This chapter discusses the research methodology used in the thesis. First a research design is discussed with links to the research philosophical premises. Then data collection is presented in detail. The data collection was mainly conducted using semi-structured interviews in case companies. In the second chapter data analysis is discussed. Finally the four case companies are introduced with an estimate of the company's financial performance.

The chosen research philosophy is accompanied with some common methodological choices. As for the thesis, both critical realistic and pragmatic philosophies consider qualitative and quantitative methods to provide truthful information. Pragmatism also suggests to use mixed or multiple methods designs. (Saunders et al. 2009, p. 119) In the thesis, a more qualitative approach was chosen as it well suits a case study and allows rich data collection. This way it is possible to more comprehensively understand the research problem and approach its novelty.

The objective of the research is to identify resources and capabilities creating competitive advantage as well as to recognize those affected by a business ecosystem. To do so, the research is conducted as a cross-sectional multiple case study. A case study strategy allows investigating a phenomenon in its real life environment which enables rich understanding of the context (Saunders et al. 2009, p. 145-146). Multiple cases are used in order to gain a more general understanding of the topic outside the uniqueness and individual conditions of a single company (Yin 2009, p. 61) making the findings to be more easily generalized. Additionally, this enables different kinds of ecosystems to be studied and the cases to be compared to one another.

6.1 Data Collection

Research material is collected using interviews and exploring company websites and press releases. Interviews conducted are semi-structured. A semi-structured interview allows the collection of in-depth qualitative data on predetermined themes from the perspective of the interviewee (King 2004, p. 11). Furthermore a semi-structured interview is often used in explanatory research (Saunders et al. 2009, p. 323) which this thesis presents. Data collection takes advantage of CLEEN ARVI and FIMECC UXUS research programs. ARVI program studies material value chains internationally and aims to build understanding of business opportunities related to recycling of materials (ARVI Factsheet October 2014). ARVI program also examines business ecosystems which affected the choice of how to treat the external environment of a company. UXUS pro-

gram studies user experience thinking in Finnish metals and engineering industry and aims to develop and improve their competitiveness (A glimpse of UX for B2B industry - issue 1). Collecting data in the context of ARVI and UXUS programs ensured the access and commitment of case companies. Additionally, one case company is selected outside the aforementioned programs. This company complements the other case companies and provides a case with a similar offering as another case company. An access to this company was gained utilizing a supervisor's personal connection within the company.

Before contacting the case companies, interview themes were articulated based on the theoretical understanding of resource-based view and business ecosystems. An interview outline was developed and pre-tested within the research group. Also a list of resources and capabilities creating competitive advantage was formulated to orchestrate discussion on them. During the interviews, the list was handed out and participants were asked to mark five resources or capabilities they think to create competitive advantage for their company. These five resources and capabilities were ranked with 1 being the most important and 5 the least important. The respondents were also advised to add resources or capabilities to the list if they feel there is something missing. The interview outline, accompanied with the list of resources and capabilities, is presented in Appendix A (only available in Finnish). The interview outline and the list of resources were not given to the respondents in advance but a shortened outline was handed out at the beginning of the interview.

Five interviews were conducted in total. One of the interviews contained two respondents and others one as shown in Table 4. Average duration of actual interview time recorded was 36 minutes. Interview occasions included some additional small talk which was not recorded as it did not provide useful data. This time is not included in durations presented in Table 4.

Table 4. *Interview respondents' titles and interview durations.*

Company	Title	Duration
Company A	Product Sales Manager	28 min
Company B	Chief Technology Officer	47 min
Company C	Vice President, Pallet handling	26 min
	Company Development Director	47 min
	Vice President, Global project management	47 min
Company D	Chief Executive Officer	30 min

The interviews were conducted solo by the researcher in early March 2015 and they all happened face-to-face. The respondents were chosen together with the supervisors of the thesis and in Company C's case using a contact person. The choices were made keeping in mind that an ideal respondent is rather well informed of the company's actions as a whole and can thus discuss the chosen themes from a wide perspective, but is at the same time aware of what is happening at the floor level. The researcher was responsible for scheduling the interviews.

6.2 Data Analysis

The data collected for the thesis is qualitative in nature. Qualitative data being non-standardized, non-numerical and often complex leads to a demanding analysis process including data summarization, categorization, and structuring using narrative (Saunders et al. 2009, p. 482, 484). These procedures can be used on their own or in combination to uncover valuable findings (Saunders et al. 2009, p. 491).

Every interview for the thesis was audio recorded and transcribed to enable a rich material analysis. The recordings were transcribed by an external service provider. The transcripts were read while listening to the recordings to ensure the transcripts' accuracy and familiarize oneself with the data. The data was also compared to case company websites and other material to ensure that no respondent was opposed to his company's general lines. Data analysis was then conducted using sophisticated qualitative data analysis software called ATLAS.ti. The data analysis with ATLAS.ti included coding the data. Corbin & Strauss (2008, p. 66) emphasize that coding is not just notes in the margin but involves interacting with data by questioning and comparison for example. Coding thus takes the raw data and raises it to a conceptual level (Corbin & Strauss 2008, p. 66). After coding the data was categorized using categories that mainly arose from the interviews. Company, ecosystem and resource descriptions were sent to company respondents for verification in case of mistakes or misunderstandings.

As for Company C, there were three lists of resources and capabilities filled. Resources and capabilities chosen for examinations as well as their order of importance (1 being the most important, 5 the least important) were determined by the average for each resource and capability. Five resources and capabilities stood out with a 2.7 or higher importance in average. The rest were of 4 or lower importance. Nevertheless, only four resources and capabilities were left out of examination signaling a rather consistent choices on behalf of Company C's respondents.

6.3 The Cases

One of the objectives of the research is to identify which resources creating competitive advantage are affected by a business ecosystem. Thus the case companies are to represent different ecosystem stages and strategies in order to differ in the composition of

resources. In this setting a non-probability sampling is chosen. Furthermore a heterogeneity sampling is used in order to bring out differences. This sampling strategy's purpose is "[t]o obtain information about the significance of various circumstances for case process and outcome" (Flyvbjerg 2006, p. 230). However, for the results to be more generalizable, case companies are to form pairs. Therefore the case companies would represent two homogenous companies that are heterogeneous with another two homogenous companies.

The case companies were mainly chosen among the companies being a part of ARVI or UXUS programs but a pair for a factory automation company was sought outside these programs. In order to retain the anonymity of the case companies and in consequence of a respondent's request, no detailed information is provided concerning the case companies. They are simply called Company A, Company B, Company C and Company D. Companies A and B provide tangible products accompanied with services like maintenance forming the first pair of companies. Companies C and D are automation solutions providers and thus paired up. All the companies are located in Finland but some also have global operations. Case companies are introduced in Table 5.

Table 5. *Introduction of the case companies.*

Company	**Description**	**Financial performance***
Company A	The case department is specialized in equipment and processes of combustion gas cleaning and burners for pulp and paper, energy and biomass industries. The company has no manufacturing of its own, but uses various suppliers who work based on designs made by Company A.	good
Company B	Provides solutions for biomass and solid waste handling and processing for pulp and paper, and energy industries. The products provided include conveyors, storage, shredders and separators. The company is also one of the few who provide solutions for solid recovered fuel process. The company has no manufacturing or assembly of its own but suppliers are used.	average/good
Company C	Offers automation solutions for manufacturing and assembly in metal working including both hardware and software solutions. Automation solutions are designed, assembled and delivered by Company C. Structures and components used in assembly are sourced from suppliers.	average
Company D	Offers software solutions for industry and logistics including inventory management, process management and reporting. Solutions consist of process improvements accompanied with management software. All the solutions are integrated to existing software of the customer company.	good

* estimated by the company respondent

Company A is a global operator serving multiple industries like pulping and paper as well as energy and biomaterials. The thesis focuses on a department located in Pirkanmaa and specialized in combustion gas cleaning and burners. Company A hereafter refers to this specific department. The respondent estimated Company A to perform financially better than many of its rivals. Company B offers solutions for biomass and solid waste handling as well as solid recovered fuel (SRF) process solutions. The respondent estimated Company B's financial performance to be at the same level as its main rival's in biomass processing and better in solid recovered fuel solutions though the estimation in this regard was difficult due to the newness of the technology.

Company C has its headquarters in Pirkanmaa with several subsidiaries globally. Company C offers automation solutions that are provided straight to the customer but also as a part of a machine tool manufacturers' offering and nearly all are exports. The respondents estimated Company C's financial performance to generally be at the same level with their competitors in the automation industry though some rivals currently perform better. Company D, also located in Pirkanmaa, provides software solutions for industry and logistics. Company D's customers are mainly Finnish. The respondent estimated Company D to perform better than its competitors since the company has seen growth in recent years contrary to one of its significant rivals.

7. RESULTS

The chapter begins with examination of case companies' business ecosystems, relationships in them and ecosystem strategies. The introduction of case companies' ecosystems gives background information on the environment in which case companies conduct their business in. After the ecosystem descriptions, the case companies' sources of competitive advantage are introduced. Presenting sources of competitive advantage only against the ecosystem context makes them easier to understand. Finally these two topics are discussed together and connections are made.

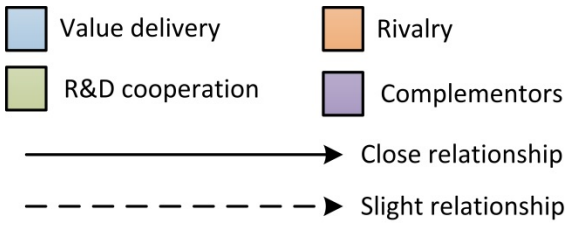
The analysis was narrowed down in some aspects. Case company B recognized mass burn technology solution providers as its rivals. Also Company C recognized alternative investments to production improvement as a competitive force. Only rivals, and their ecosystems, pursuing technologies similar to those of the case companies were taken into account. This affects the ecosystem evaluation putting emphasis on case companies' point of view.

7.1 Case Companies' Ecosystems and Ecosystem Strategies

The ecosystems of all case companies are selectively open and characterized by contractual relations. Therefore rather resemble supply chain platforms than business ecosystems (Gawer 2014). However, value is created rather through a network than through a supply chain, relationships in the networks are complex and stabilized justifying the ecosystem analysis.

7.1.1 Ecosystem Descriptions

In the following Figures 4, 5, 6 and 7 the multitude of suppliers and assemblers is depicted using single boxes only in order to keep the figures neater and easily readable. The companies thus have more than one supplier and assembler. Also the customer and complementor boxes depict multiple companies in that group. The key to colors and lines used in the figures is the following:



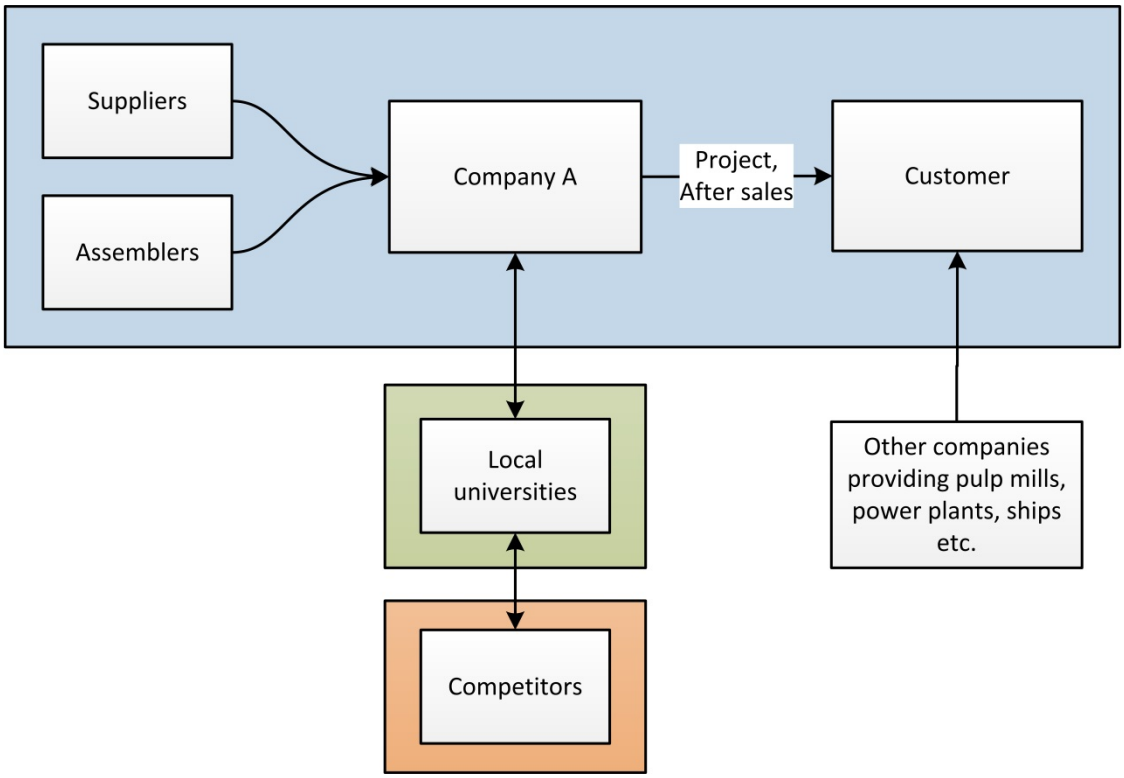


Figure 4. *Company A's ecosystem.*

Company A utilizes its networks (Figure 4) in many stages of a product delivery project. Company A's ecosystem has a wide network of suppliers and assemblers of which the partners for a specific project are selected. In addition Company A's ecosystem includes local universities in terms of technology research. Competitors also participate to university research projects. Company A has few big competitors especially in burners and many small competitors in other products.

Company B's respondent recognized many ecosystem members in varied fields as illustrated in Figure 5. Company B operates globally among politics and other actors in public administration in order to follow and actively shape its environment. Company B also cooperates with the research field to advance its technology. The network includes domestic and foreign universities and research centers as well as professionals and consulting companies. As for the operative actions, the ecosystem includes suppliers and assemblers all over the world. The same ecosystem members also serve the after sales market providing for example maintenance. In addition, Company B is well aware of its complementors and cooperates with them to provide the customer a complete solution. Furthermore agents are used to expand Company B's internal sales resources. In addition to sales, the agent network also gathers ideas and project opportunities. Company B's main competitor in biomass handling is a local company that was established by Company B's former employees. The company also has some global competitors in SRF technology.

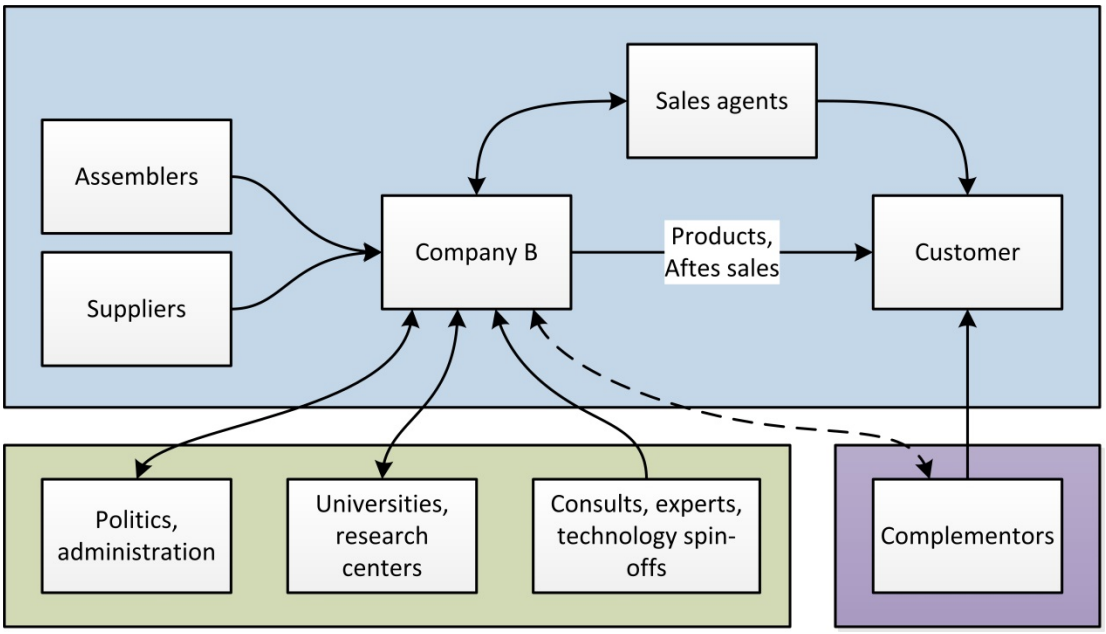


Figure 5. *Company B's ecosystem.*

Company C has two distinct ecosystems depending on whether the company's solution is sold as a part of a machine tool manufacturers offering (Figure 6a) or independently (Figure 6b). Both ecosystems have a network of suppliers, assemblers and other partners working in planning and design for example. As for the sales in Figure 6a, machine tool manufacturers form an important network as Company C's solution is a part of their offering and often sold through their agents. In these sales Company C's solution is a complement to the machine tool manufacturer's solution and not always in sales representative's focus. It is important for Company C to team up with the right machine tool manufacturer and to find the right contact persons. In addition, Company C has some agents of its own for direct sales (Figure 6b). In both ecosystems, current customers are the main clientele with repurchases and extensions. Additionally, the company cooperates with local universities. Company C's rivals are companies providing similar solutions and especially those located in Central Europe. Also some machine tool manufacturers have automation solutions of their own making them collaborators and competitors at the same time.

Company D only provides software which makes complementors a vital part of its ecosystem. In fact, as illustrated in Figure 7, complementors are the only member the respondent recognized in addition to customers. This is due to the software being developed in-house. Complementors provide for example warehouse furnishing and automation systems. Local universities are an important recruiting channel providing a pool of talented and enthusiastic candidates. Company D has both big global software houses and very small companies and sole entrepreneurs as its competitors.

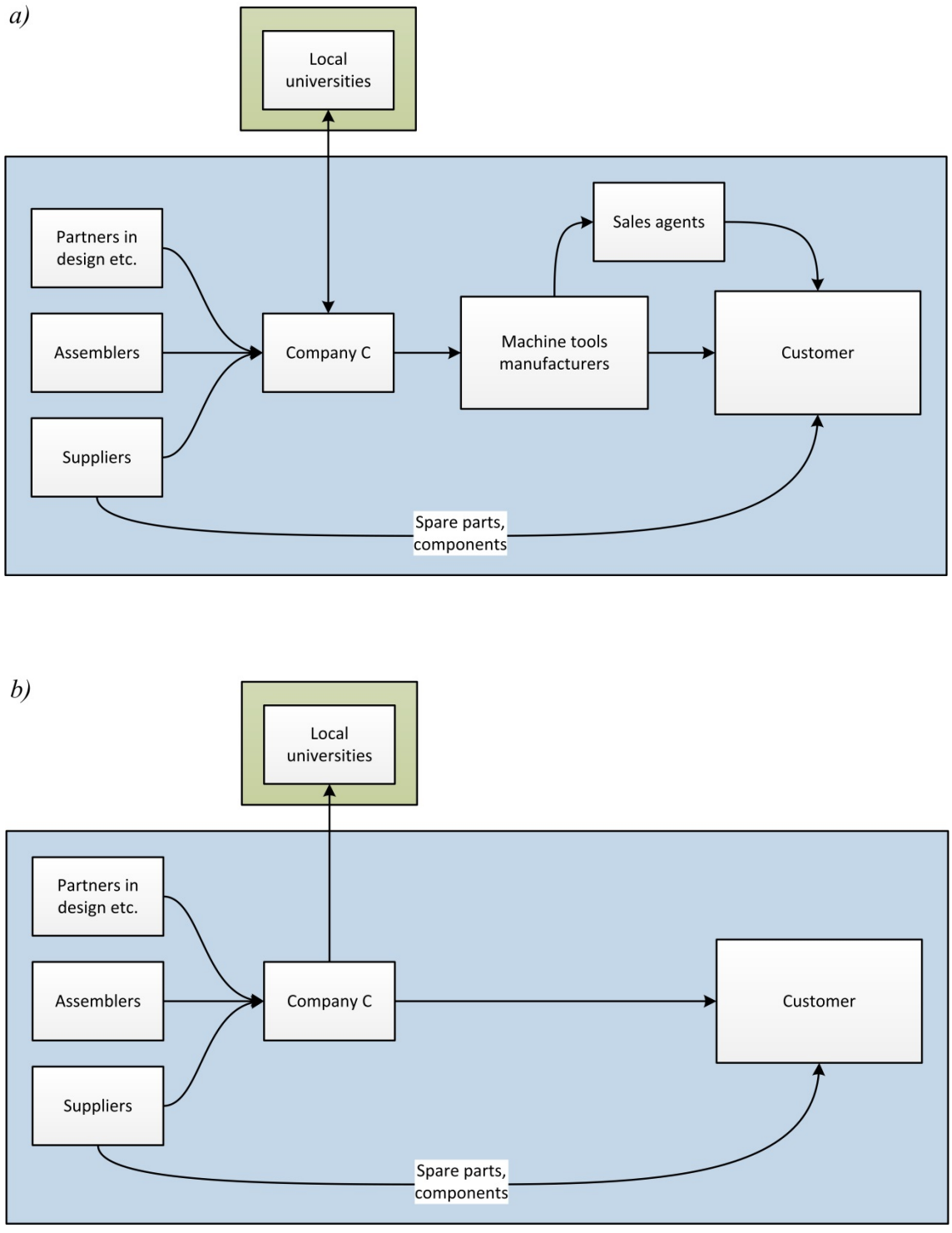


Figure 6. *Company C has two kinds of networks for a) complementing a machine tool manufacturer's offering and b) direct sales.*

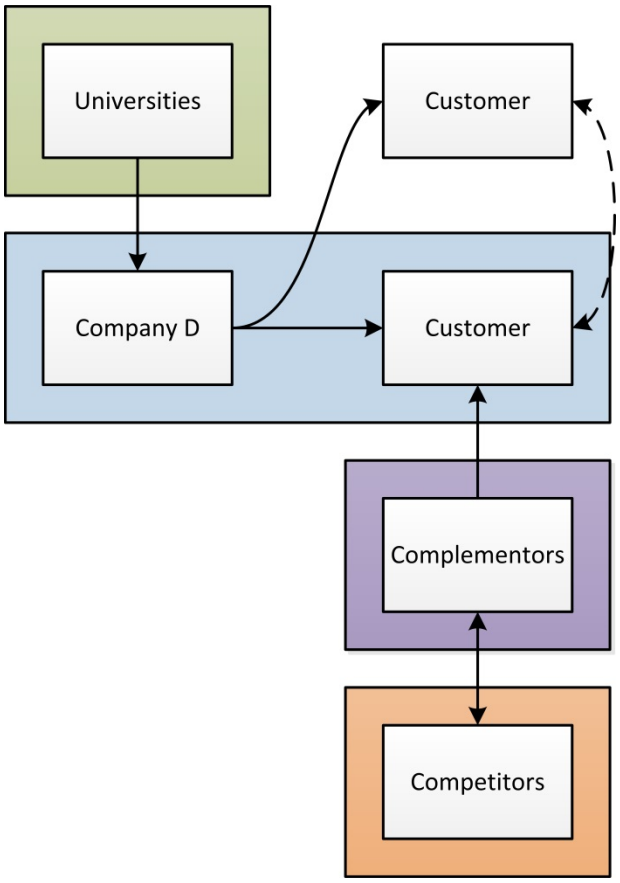


Figure 7. *Company D's ecosystem.*

Together with the ecosystem structures, the rate of changes in them was looked upon. Based on that, the evolutionary stages of the case companies' business ecosystems were identified. All companies' ecosystems undergo no radical changes as most changes are adjustments in supplier and assembler base depending on the project at hand and on product improvements. The ecosystems are rather stabilized and hence "ready" and there does not seem to be alternative technologies emerging. Therefore the ecosystems are best described to be in the leadership stage.

The number of members recognized in a company's ecosystem varied a lot between case company' respondents. Company D named only two member groups, Company A named five and both Companies B and C named eight. Case companies can thus be divided into two groups based on the number of ecosystem members they recognized. Companies A and D having fewer member types in their ecosystem form one group and Companies B and C form the other. The ecosystems are named small and wide respectively.

There is no evident reason for the difference in number of ecosystem members. It would seem that the difference is partly due to the nature of business. Company D for example focuses on software solutions hence the supplier network is nonexistent. On the other hand some companies more focus on their ecosystem than others. For example Compa-

nies A and B have a rather similar ecosystem on behalf of suppliers and sales and their businesses resemble one another. Company B however is more aware of the members that are not linked to daily operations. Thus the differences in ecosystem size are also related to a company's awareness of its surroundings. A respondent's position in the company plays a big role in this regard as some people are more aware of their company's collaborative actions than others. Company B's respondent for example actively participates into actions that shape the industry whereas Company A's respondent is a sales manager and thus more closely linked to operational activities.

7.1.2 Relationships in the Ecosystems

The relationships in the case companies' ecosystems range from hostile rivalry to close cooperation. The relationships towards different members vary and can be warm towards some suppliers while cautious towards ecosystem leader for example. In general the relationships towards customers were warm whereas relationships towards suppliers and other partners differed between the ecosystems.

Due to the nature of Company A's project business with changing partners, the relationships with suppliers and assembler are not quite open. Information on technical and other essential aspects is shared with project partners but especially monetary issues are well kept to oneself. There is rivalry among suppliers and assemblers. As for the universities the relationships in general level are open and project are conducted with competitors but the closer it gets to an actual product the less information is shared. All in all the cooperation is most often marked by money transfer.

The relationships in Company B's network are highly cooperative and based on trust. Even though suppliers and assemblers are invited to tender, the contracts are increasingly made for a year instead of for a single project which increases openness. Furthermore, subcontractors that get to be involved in technology improvement projects are flattered and readily involved. Also the relationships towards complementors are good and common interests are highlighted. The company acknowledges that in order to gain something from the network you must give in return and hence the network is guided towards a wanted direction through communication and interaction.

Company C's network is complex. Due to the rapid and repeated changes of machine tool manufacture partners and intense rivalry among them, Company C's network's openness in this area is limited. A partner today can be a rival tomorrow giving the relationships with machine tool manufacturers a suspicious undertone and raising questions about leakages of information. Cooperation limits to technological issues. The relationships with customers are more open but not trouble-free. A customer can for example be taken to see the solution at another customer's premises but no recommendations can be given when Company C offers its solution with multiple machine tool manufacturers – not even when a certain offering is seen to best suit the customer's needs. Relationships

to suppliers and assemblers on the other hand are rather open and can even be described warm. Cooperation with long term partners is straightforward and friendly with low formality. Relationships to suppliers and assembler are nevertheless revisited regularly and most suppliers are easy to replace if needed. Many relationships between Company C and its network members are based on personal relationships as individuals from different companies are in good standing.

In Company D's network the relationships towards and between customers are rather open. Customers operating in the same industry can sit down in one table and talk and those operating in different industries also share experiences. Company D also connects its customers working with similar automation issues. Relationships with complementors are more market oriented and openness is interactive aiming for a deal. There are no exclusive complementors but complementors also work with Company D's competitors.

As a summary, the case companies provide a wide variety of business ecosystems to be analyzed. Tangible products bulk large in Companies A and B's offering and their ecosystems were thus thought to be similar. Company B's ecosystem is however wider and, what is more important, more open and cooperative. Additionally, both Companies C and D offer their customers software solutions to improve productivity. Despite the resemblance of the offerings their ecosystems nevertheless are very far from each other. Company C has a wide but very selectively open ecosystem whereas Company D's ecosystem is small but more open.

Similar offering is thus not a reason to assume a similar ecosystem and to pair companies up for examination. Also the division to small and wide ecosystems gives an insufficient tool to pair companies up for future examination. This is due to differing levels of openness in the case companies' ecosystems as both small and wide case ecosystems have one open and one less open company. All in all, the original idea to form pairs of the case companies is abandoned and companies are rather examined individually.

7.1.3 Ecosystem Strategies

Not all case companies' ecosystem strategies can be unambiguously determined. The case company respondents not only considered their company to have multiple strategies but also their notion of ecosystem strategies differed from the literature.

Company A describes its strategy mainly as niche with highly specialized products but adds that the low number of companies with a similar offering gives Company A some qualities of a leader. The reasoning for niche strategy is in line with the literature (Adner 2012; Kapoor & Adner 2012; den Hartigh & van Asseldonk 2004; Iansiti & Levien 2004) but the leader role is more debatable. Company A reasons the leader role by referring to few companies and new technologies that will become more common after few sales. According to literature a leader bears the risks related to new technologies (Adner

2012), actively shapes its environment (Hagel 1996) and works to increase the ecosystems overall health (Iansiti & Levien 2004). In comparison with Company A, the company does bear the initial risks and is a leader in that sense. Nevertheless, Company A does not act to shape its environment or to increase overall health of the ecosystem and does not fit the leader role in this regard.

Company B has distinct strategies for biomass handling and SRF technology. In biomass handling Company B tells to have a physical dominator strategy but other parts of the interview do not support this notion very well. A physical dominator tries to own or control the ecosystem (Iansiti & Levien 2004), qualities that neither fit Company B. Company B does not own much of the ecosystem but uses suppliers and assemblers. In addition the relationships towards suppliers are give-and-take with little dominance. It would seem that Company B uses dominator to refer to a dominating position in the market. As for SRF technology, Company B describes itself as a leader which is seen in strong attempts to shape the environment and in technology advances. These well fit the characteristics of a leader found in the literature (Adner 2012; Gawer & Cusumano 2002; Iansiti & Levien 2004; Moore 1993). However if Company B only delivers a specific part, let us say a chain conveyor, to a power plant, the company would rather fall into a follower strategy.

Moving on, Company C exercises a clear niche strategy as the company's automation solution complements the hardware and is highly specialized. Company C however admits that it would like to be a leader or a dominator which makes the company more or less a wannabe described by Gawer & Cusumano (2002). Company C was the only case company to admit that the company would like to pursue an ecosystem strategy different from the current strategy.

Company D describes its strategy to be a leader but in a highly automated warehouses the strategy fall into a follower. The size of Company D's network raises the question if an ecosystem that small can have a leader. Company D nevertheless exploits complementors and is itself not a complementor as the company's solution requires redesign and reorganization a client's processes giving Company D's solution a central position. On the other hand the scarcity of ecosystem members makes it hard to share value with others but customers. Sharing of value is nevertheless one of the main characteristics of a leader (Adner 2012; Iansiti & Levien 2004). Company D's ecosystem strategy could be best described as "a leader in a niche industry", as the respondent suggested.

As a conclusion, companies have different strategies in different business areas or their strategy changes depending on the situation at hand. Thus no company can be said to purely address just one strategy. Therefore ecosystem strategy alone is an insufficient reason to group companies for examination. In order to comprehensively understand and analyze a company in a business ecosystem, also the ecosystem size and the nature of the relationships in it must be taken into account.

7.2 Resources and Capabilities Creating Competitive Advantage

Resources and capabilities creating competitive advantage, based on case companies' respondents' answers to the handout list and on resources and capabilities' importance are the following. Number 1 is the most important and 5 is the least important. All the resources and capabilities mentioned are also illustrated in Figure 8. As for Company C, the importance is an average of three respondents' answers and some resources and capabilities ended in a tie. Hence the item three is presented twice.

Company A

1. Employees' skills and experience
2. Technology
3. Rapid adaptation
4. Network readiness for a new product
5. Pricing

Company B

1. Employees' skills and experience
2. Understanding customer needs
3. Technology
4. Strategy
5. Effective business processes

Company C

1. References
2. Employees' skills and experience
3. Belonging to certain networks and their actions
3. Relationships to stakeholders
5. Reputation, brand

Company D

1. Relationships between employees and management
2. Employees' skills and experience
3. Rapid adaptation
4. Relationships to stakeholders
5. Geographic location

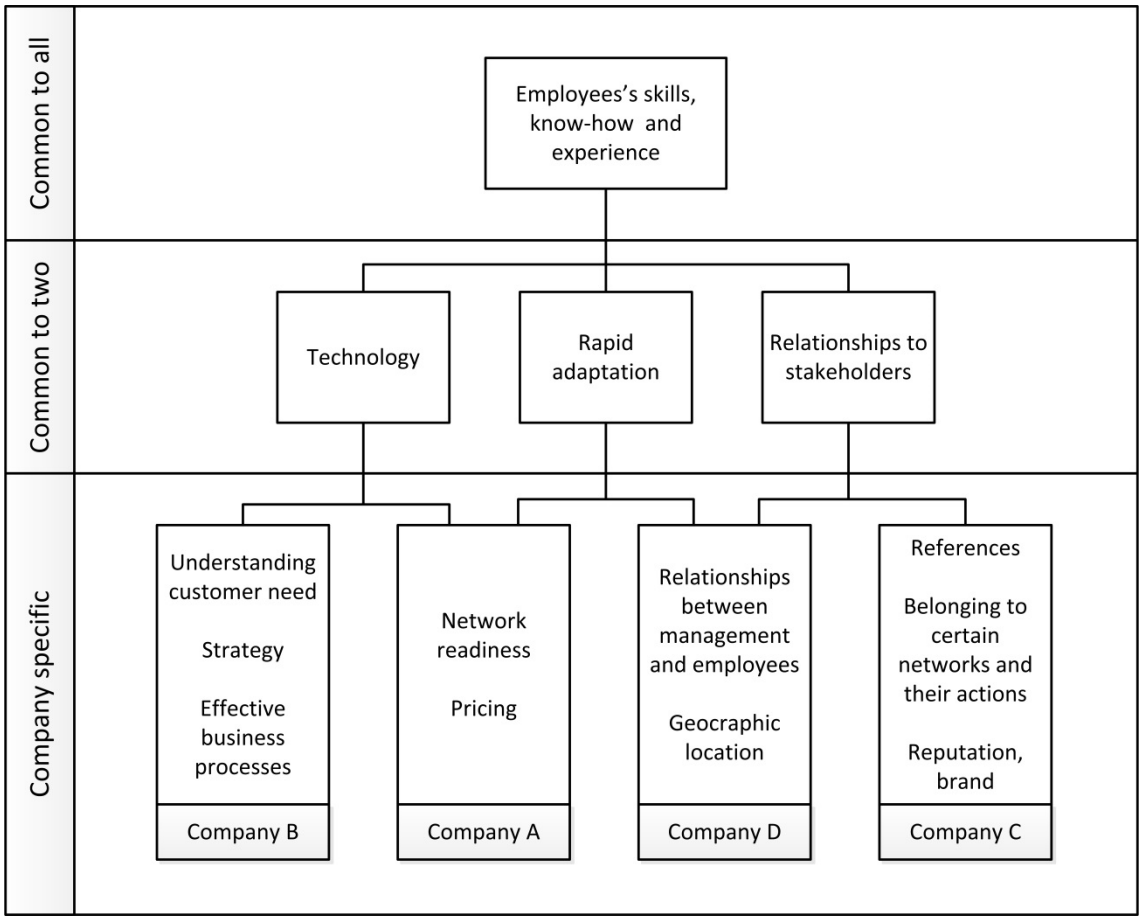


Figure 8. *Resources and capabilities creating competitive advantage.*

Even though some respondents admitted to consider sustainability when selecting the resources and capabilities that bring competitive advantage to their company, the resources and capabilities are rather practical. As for the VRIO framework, resources and capabilities are valuable and organizationally fit for sure. Their rareness and inimitability however are not granted. It is difficult to say judging from just this data if the resources and capabilities fulfill the VRIO framework or not.

7.2.1 Common Resources and Capabilities

Only one capability was highlighted by all the respondents, namely employees' skills and experience. Also the number of resources two companies have in common is small. Common resources were technology for Companies A and B, rapid adaptation for Companies A and D, and relationships to stakeholders for Companies C and D.

The one capability to bring competitive advantage for all the case companies was employees' skills and experience. This capability was not in the original framework however. As for employees' skills and experience, Company A highlighted sales experience and noted that it is not only the experience but also the willingness to share it that brings

success. Company B pointed out that everything starts with skills and know-how. Especially experience and values that hold the cumulated understanding of customer need were highlighted. Company C brought up versatile know-how and ability to realize demanding solutions. In addition, experience is gained through long lasting employments. Also Company D highlighted versatile know-how and experience enabling complex and extensive solutions. Additionally, knowledge and experience on customer's industry is needed. All in all employees' skills and experience consists of diverse range of talents and attainments with company specific emphases. Furthermore it is not enough to have all this but experienced staff must also be ready to share their knowledge and experience to new employees.

For Company A technology is important due to the company's specialized offering and continuous improvements. Company B on the other hand saw competitive advantage when technology is widely adaptable to different customer needs and high utilization rates are ensured at the same time. The technology must also be clever in a way that it differentiates Company B from its competitors. When technology is improved, competitive advantage it creates is kept in mind.

Rapid adaptation, common with Companies A and D, was understood slightly differently. Company A referred to rapid adaptation as adapting to changing customer requirements and sites. Company D also saw adaption as adjusting to customer needs and seeking for profitable business but highlighted adjusting to notable changes in the environment too. These are for example changes in customer base.

Also relationships to stakeholders play a different role for Companies C and D. Company C emphasized relationships to suppliers and customers and pointed out effective delivery and sales to existing customers. Company D on the other hand emphasized customers and especially trust which brings deals. To Company D good relationships also mean solving problems together if something goes wrong. Bigger number of common resources and capabilities were expected especially between Companies A and B as well as between Companies C and D due to similar businesses.

7.2.2 Company Specific Resources and Capabilities

Most of the resources and capabilities to bring competitive advantage were company specific. These were network readiness and pricing for Company A, understanding customer need, strategy and effective business processes for Company B, references, belonging to certain networks and reputation for Company C, and relationships between management and employees as well as geographic location for Company D.

Resources and capabilities creating competitive advantage specific for Company A were network readiness for a new product and pricing. As for network readiness, Company A emphasized customers' readiness to take in a new product or solution. Suppliers will

supply what is needed but the customer needs to be convinced that the new solution works and the customer needs it. When a new solution is invented it is quickly advanced. All in all, resources and capabilities of Company A discussed this far set the basis for pricing and final negotiations. Closing a deal is not self-evident and last minutes can get tough. Once again experience is needed.

Company B's specific resources and capabilities were understanding of customer need, strategy and effective business processes. These were all added to the predetermined list by the company respondent. Understanding customer needs boils down to the relationship between the customer and Company B's representative. Customers are often unsure of what they need and interaction leads to a best possible solution while experience and understanding give competitive advantage. Strategy as a competitive advantage is used to refer to good understanding of Company B's current situation as well as future development. A company which must anticipate its customers' needs and relies heavily on technology must have a clear strategy if it wishes to prosper in a competitive environment. Effective business processes relate to Company B's internal operations as well as interfaces between Company B and its suppliers. Effectiveness straight influences profitability and brings competitive advantage especially in hard times and on whole company scale.

Company C's most important source of competitive advantage, references, was added to the list by a respondent. Other company specific resources were belonging to certain networks, and reputation. References prove that a company has successfully delivered a solution and they can be used to illustrate if a certain solution is suitable for a potential customer. Belonging to certain networks mainly refers to existing customers which correspond for most of the sales. Company C has a strong reputation and the company has managed to dominate some markets with its solution. Even some competitors use Company C's name to describe their systems even though they had nothing to do with the company.

Company D's unique sources of competitive advantage were relationships between management and employees, and geographic location. The importance of relationships between management and employees comes from the fact that only employees who really want to work for the company stay there. In addition, the relationships enable employees to know where the company is heading to and to feel their work is meaningful. Geographic location in Western Finland is ideal for traveling to Finland's biggest cities including Helsinki where most customers' headquarters are. Furthermore the location allows Company C to benefit from local university graduates having good working ethics and an inspired attitude.

Resources and capabilities creating competitive advantage for the case companies are very different. Resources and capabilities that were added to the predetermined list on behalf of respondents were: understanding of customer needs, strategy and effective

business processes by Company B and references by Company C. References are important in business-to-business context but they were not specifically brought up by other companies. They are however visible in Companies A and D's web pages and Company D indirectly referred to them by telling that a potential customer can be taken to see a solution at another customer's premises. Had references been on the predetermined list, this resource's overall importance might have changed. The resources added to the list as well as other choices represent the unique situations in each company. The collection of resources draws a picture of each company. Company A's collection emphasizes sales and products. Company B is more focused on the network and future directions. Company C representing a niche strategy stresses reputation and preservation of its position in the ecosystem. Company D's collection emphasizes employees and team spirit. Naturally the position of the respondent of a company has an effect on which resources and capabilities appear important as all the respondents see the company from their point of view and focus on their sector.

7.3 Discussion

The objective of the research was to identify the resources and capabilities that create competitive advantage and examine which are affected by the business ecosystem. The problem was covered building on ecosystem strategies. The empirical results suggest that not only ecosystem strategy but also ecosystem size and the relationships in it affect sources of competitive advantage. The only capability the case companies identified in common was employees' skills and experience. In addition Companies A and B have technology, Companies A and D have rapid adaptation and Companies C and D have relationships to stakeholders in common. These together with the company specific resources are illustrated in Figure 8 in Chapter 7.2. Both common and specific resources and capabilities are further discussed in the following chapters.

7.3.1 Common Resources and Capabilities

All companies named employees' skills and experience as a competitive advantage. It seems to be the only resource or capability the business ecosystem does not affect. Of course there are different emphases specific for the companies. Company A emphasized that in business ecosystem context, where things are rarely done alone, skills and experience outside the company are also important and a company must have the know-how to recognize and use the skills in its environment. Also in order to benefit from close ecosystem members a company must give something to the ecosystem in return and thus have skills and experience appreciated by the ecosystem, as noted by Company B. Company B also adds that skills and experience to orchestrate the ecosystem are needed. The better the cooperation between skilled ecosystem members the more convincing it is in sales and delivery, said company C and added that in an ecosystem both good and bad experiences highlighted affecting future sales. Company D added that personnel

bring continuity and stability. After all, independent of the ecosystem and a company's strategy in it the company "must also deliver the solution, not just talk about it", as one of Company C's respondents put it. Case company experiences fit the network management of the framework in Chapter 5. However, companies having both leader and follower strategies indirectly consider network management as an important capability.

Companies A and B having technology as a source of competitive advantage both have a tangible product as an offering. Company B pointed out that using technology as a competitive advantage in an ecosystem practically means selecting the right partners to work with. Apart from the tangible product, there are no other distinctive features connecting the companies as their ecosystems differ, the relationships in their ecosystems are not equally open, and they, for most parts of their businesses, have a different strategy in the ecosystem. Therefore this resource creating competitive advantage is more related to other aspects than the ecosystem.

Both Companies A and D have small ecosystems and have no clear partner in the ecosystem. This might explain why these companies consider rapid adaptation a source of competitive advantage. The lack of partner can increase sense of instability making rapid adaptation a vital capability. On the other hand standing solo enables rapid adaptation as there is only one company whose operations need adaptation. As for the size of and ecosystem however, Companies B and C having wide ecosystems and more close partners have no common resources. This might be due to many resources added by the respondents.

Companies C and D have relationships to stakeholders, and to customers specifically, as a competitive advantage. Company C has a wide and not very open ecosystem whereas Company D's ecosystem is small and more open. Thus no common ground is found in these aspects. The importance of relationships to customers might be explained by the size of the companies compared to their customers. Small companies are often dependent of their big customers. Falling into disfavor in the eyes of a big customer in a niche market, where the word travels fast, can prove to be as disastrous as favor is advantageous. This is especially true for Company C who is a follower in its ecosystem. As for Company D, the position as a leader is at stake. Thus relationships require nurturing despite the ecosystem strategy of a company.

All the case companies brought their home country (Finland) up in the interviews. Company A pointed out that Finns are known worldwide and Company B added that Finns are wanted partners making it easy for Finnish companies to integrate to other networks as well as to establish their own. Furthermore Companies B and D noted that in Finland, Finland being a small country, everybody knows everybody. This makes cooperation rather open and straight. Thus the nationality of a company seems to have an effect on how the ecosystem treats the company. It is however unsure it nationality brings competitive advantage or is just a nice addition.

Companies A and C as followers have no common resources but both have resources in common with companies characterized as leaders. The same goes for leader companies B and D having common resources with followers but not with each other. Thus a company's strategy in the ecosystem seems to have only little effect on which resources and capabilities create competitive advantage and no pattern based on roles emerges.

7.3.2 Company Specific Resources and Capabilities

Company specific resources and capabilities bring about the special features of each case company's business ecosystem. They reflect not only the ecosystem size but also the relationships in it. Company specific resources are here discussed one case company at a time. Not all company specific resources and capabilities are gone through one by one. Rather only some are highlighted with their connection to the business ecosystem.

As for Company A, new aspect arose concerning network readiness. Company A emphasized customer's readiness to adapt a new product. The supplier network is easy to update when a new product is to be launched as suppliers will deliver all that is needed based on Company A's specifications. Company A does not need to worry about complementors being ready for the new product as there are no complementors for Company A's solutions but Company A rather complements other's solutions. Thus the customer's decision to adapt or not adapt a product is not up to complementors' offerings but according to Company A it is legislation and emission standards as well as customer's trust that the solution works that determine the willingness to invest.

All the company specific resources and capabilities of Company B were added by the respondent. These resources and capabilities do not relate to the ecosystem very strongly though Company B seemed to be the most ecosystem oriented case company. Furthermore the resources and capabilities are not specific but represent wider concepts. It would seem that in a wide ecosystem with versatile relationships competitive advantage is not created through particular resources or capabilities but it rather arises from understanding and managing the ecosystem around the company and not losing oneself in it. This is why a clear strategy is needed.

Specific resources and capabilities of Company C highlight the importance of reputation and references. This might be due to Company C's position as a niche plyer in the ecosystem. As presented by Company C's respondents, if a sale is made together with a machine tool manufacturer, the customer's decision is mainly based on what the machine tool manufacturer offers. Thus it is important for Company C to be a preferred partner with as many machine tool manufacturers as possible in order to increase the probability of getting through. Furthermore Company C operates in a highly conservative business where it is vital to prove that the company's solution works.

Company D's specific resources are personnel oriented. The company has few ecosystem members and the solutions are based on immaterial skills and know-how which might explain the focus on the company itself. Company D has worked on different things while looking for a profitable business during the past 15 years. The company has still managed to grow and inspire its employees. Therefore Company D might best represent Collins' idea of sturdy core values and altering operations according to changes in the environment (Collins 2001, p. 268-269).

Company specific resources and capabilities reflect the case companies' business ecosystems even though not all respondents considered the ecosystem while selecting them. It appears that some resources e.g. reputation, that were thought to be common were nevertheless more specific emphasizing the difficulty to take every company's situation into account. Furthermore, innovation related resources and capabilities were thought to be more important for follower companies. Innovation activities however were barely mentioned in the interviews with the exception of cooperation with universities.

7.3.3 Summary of the Results

The framework presented in Chapter 5 proved to be inadequate. Resources and capabilities creating competitive advantage are not determined by a company's strategy and ecosystem stage only but the business ecosystem's further characteristics and relationships seem to have a great effect. In addition, the framework based on ecosystem strategies is unambiguous as case companies clearly had different strategies for different business areas or the strategy changed depending on the situation at hand. The framework did not take this into account.

There are some differences between the original framework and the picture the case companies drew. The original framework of course includes a great number of resources and capabilities and naturally not all came up in the interviews. As for the strategy independent resources and capabilities, only reputation and rapid adaptation were considered as sources of competitive advantage by the case companies. Neither can be seen as strategy independent even though rapid adaptation was selected by a leader and a follower. Both the leader and the follower have a small ecosystem making in arguable if the capability is more clearly linked to the ecosystem size than to ecosystem strategy.

In addition none of the resources and capabilities linked to a leader in the original framework was selected by the case company leaders. Instead a follower selected pricing and network readiness as sources of competitive advantage. For a leader's part the framework failed to find the sources of competitive advantage. Numerous resources and capabilities added by the other leader company might distort the results though. Furthermore, there were no clear dominator among the case companies and thus it is hard to judge the framework on a physical dominator's part.

Finally, followers are not as innovation oriented as predicted by the framework. University partners in research and innovating were part of all companies' ecosystems in one way or another. The followers' resources and capabilities that create competitive advantage represent the situation of each company and no generalizations can be made. All in all the sources of competitive advantage in the framework are quite universal. In contrast the resources and capabilities selected by the case companies are more tangible and down-to-earth.

The business ecosystem's effect on resources and capabilities creating competitive advantage is double-faced as illustrated on Figure 9. The outer loop depicts the external environment's effect on competitive advantage. The inner loop represents the internal environment's effect. These two are linked to one another through the company's sources of competitive advantage and the company's values and actions. On one hand the ecosystem's size and the relationships in it have an effect on what resources and capabilities turn out to create competitive advantage and hence superior performance. On the other hand the sources of competitive advantage reflect a company's way of thinking, its values and a course of actions. These in turn have an influence on what kind of an ecosystem evolves around the company.

By understanding how and to what extent a company can affect its business ecosystem, the company can highly affect its own success. This does not apply only to companies described as shapers but also to followers. By influencing the relationships towards its suppliers and other followers, a follower company can push its close ecosystem towards a favorable direction without having to carry all the risks related to being a leader.

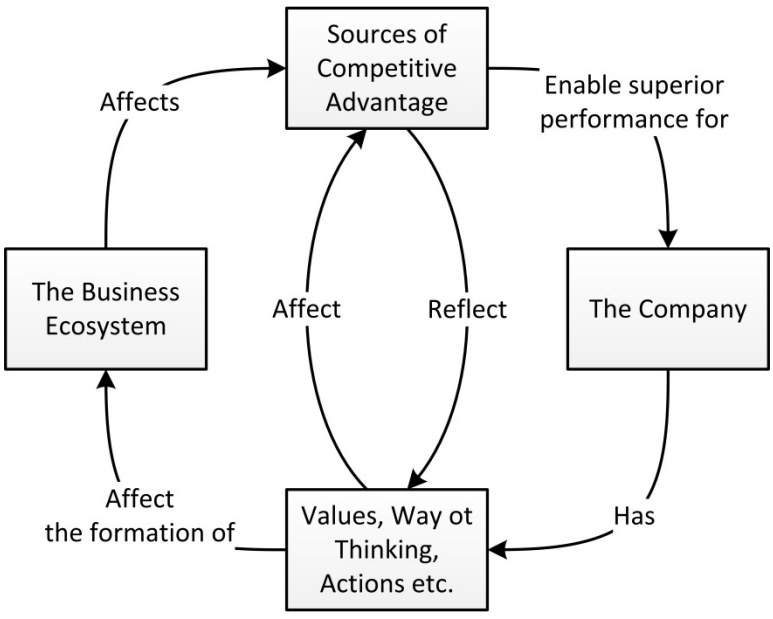


Figure 9. *A company's ecosystem affects competitive advantage but is affected by the company in return.*

8. CONCLUSIONS

The purpose of this thesis was to examine resources and capabilities creating competitive advantage from the ecosystem perspective. The objective was to bridge the gap between the literature on internal and external sources of competitive advantage. The literature review was accompanied with interviews in four case companies. Even though the literature based framework proved to be inadequate, the research questions were answered to some extent. The cases proved insightful findings even though their generalizability is limited. In this chapter the theoretical contribution of the study is summarized. In addition, managerial implications are discussed. In the end the limitations are discussed with ideas for future research.

8.1 Theoretical Contribution

By combining business ecosystem thinking and the resource-based view the study showed that it is possible and reasonable to consider a company's internal and external environment simultaneously. By only focusing on either of the aforementioned perspectives, a more restricted and incomplete view would have emerged. There truly is a fruitful middle way.

In the theoretical discussion, the ecosystem strategy of a company has gained a central position. The results did not fully support this. From the results it was seen that other aspects of the ecosystem have a great effect on sources of competitive advantage as well. For example business ecosystem size and the nature of the relationships better explained some of the results. In addition, the classification of companies based on specific ecosystem strategies turn out somewhat oversimplified in the previous literature. The literature acknowledges that the ecosystem strategy can change in time and be different for different parts of a company's business. However, there is a gap in attention to how different strategies work together.

As for the resource-based view the literature suggests more or less all-encompassing sources of competitive advantage. The results however suggest that companies tend to pay attention to more practical resources and capabilities and to how to get things done. These resources were for example references, pricing, technology and employees' skills and experience. Also the reasons given for the selected resources and capabilities were practical. For example the reasons given for employees' skills and experience were credibility in sales and delivery, recognition of skills outside the company and orchestration of the ecosystem to operate towards a desired direction. In addition the resource-based literature has disregarded references as source of competitive advantage. The lit-

erature discusses reputation and brand which are slightly different from references. Reputation and brand can be acquired through marketing but references are something that can only be achieved by delivering a functional solution.

Moreover, most literature on business ecosystems merely considers ecosystems as generic, mostly shapeless surroundings of a company. Little attention is paid to size and other characteristics of the ecosystem. The results however suggest that ecosystem features affect competitive advantage. Thus future literature ought not to discuss ecosystems in a too general level but to take its characteristics into account. More attention should be paid to the number of ecosystem members, the relationships between them and the openness of interfaces.

The results contribute to literature on network readiness for a new product or innovation. The results imply that competitive advantage through network readiness is not only related to the readiness of suppliers and complementors, as Adner (2012) and Adner & Kapoor (2010) suggest, but also to the readiness of a customer to take in a new solution. Even when the ecosystem is ready to launch a new solution or a product, the customer might not be ready to accept it. Thus, the problem drifts from convincing the ecosystem to convincing the customer. A customer's readiness to take in a new solution is increased when there is a showcase of a functional solution making the solution attractive or the customer is forces to accept the new solution due to regulations for example.

8.2 Managerial Implications

The most important implication for managers is to think beyond the borders of their own company. Competitive advantage is created by integrating the skills and know-how of the ecosystem. In order to gain full benefit from the network, managers must carefully consider how to extract competitive advantage from the network. This includes recognizing the skills around the company, managing the network in a beneficial manner, and ensuring effectiveness across interfaces.

Managers of leader companies, and those willing to be such ones, will benefit from recognizing all the possibilities to shape their business ecosystem and from seizing them. Influencing legislation in particular may possibly enhance sales as local regulations impact on how customers greet a new product. Customers go for current emission standards and no further in – for example – combustion gas cleaning. Furthermore, also the managers of follower companies may benefit from shaping their ecosystem especially in terms of the nature of relationships. Even though a follower company does not shape the entire ecosystem, the company can affect the relationships close to it and therefore change the position more beneficial in relation to other companies with a follower strategy.

Many of the respondents had hard time selecting the sources of competitive advantage of their company as these things were clearly not thought through beforehand. It would be beneficial for the managers to now and then consider their company's competitive position and sources of advantage from the manager's point of view and to ask what his department or team can do for the company's success. Also the relation between competitive advantage and the ecosystem should be thought through more carefully. Some case companies told to give a lot of thought to the network and its actions in everyday business, but when they were asked to specify how their company's sources of competitive advantage create value for the network, they had little to say.

8.3 Limitations and Future Research

Qualitative research is not to be judged on the same criteria as quantitative research. Lincoln & Guba (1985) present four criteria for judging qualitative research. These are credibility, transferability, dependability and confirmability. Credibility refers to the results of the study being credible and believable in the participant's eyes and also being congruent with reality. Transferability is the degree to which the results can be generalized or transferred to other contexts or settings. The dependability refers to the changing context and settings within which the research occurs and how they affect the study. Confirmability is the degree to which the results could be confirmed or corroborated by others and judges bias or distortion in data collection and analysis.

Since the *credibility* can only be legitimately judged by the participant, the criterion was difficult to address. The research methods used were appropriate and suitable for examination of the problem at hand increasing credibility but purposive sampling of respondents makes the sample less representative and may cause some bias. Also triangulation is limited as data were collected only using interviews and secondary sources. In this regard, Company C's results have the strongest triangulation since two interviews were conducted with a total of three participants. Those who participated in the interview with a colleague might nevertheless have limited their answers due to the other person's presence or settled to echo the other respondent's answers. Respondents of all case companies voluntarily participated in the study and were reminded that the answers are handled anonymously. This increased the likeliness of honest and truthful answers thus increasing credibility.

The *transferability* of the results is quite good. To allow transferability, a thick description of the fieldwork is needed (Shenton 2004). All the cases, respondents as well as data collection and analysis were described in detail. Also the contextual information that might have affected the results and their transformability was pointed out. These contextual factors were for example the respondents' positions in the company, the number of respondents in each case company and the resources selected for the handout list. In addition the nationality of the case companies might have had an effect on their answers as Finns were described to be straightforward and positively known glob-

ally. It would be interesting to know how much the nationality affects for example the relationships or knowledge sharing in the ecosystems.

As for the *dependability*, there are several aspects to be considered. All the interviews were conducted face-to-face increasing the data collection conformity. However, the researcher did not have extensive experience on interviewing and a learning curve was noticed. Also the previous interviews affected the supplement questions of the latter interviews. This puts the interviews in an unequal position since the first interviews did not flow as easily as the latter. Had there been more experience the first interviews could have provided more in-depth data and the dependability would have decreased. In addition the interviews were semi-structures and even though the outline remained the same, the interviews took different paths depending on the respondent's knowledge and interests. Moreover, had another researcher coded the data, different code types and subjects of interest could have emerged. Data analysis process could have been documented and described in more detail to increase the transparency of the process.

Confirmability was enhanced by cross-checking the interview data against webpages and other material such as press releases. Also some contradictions within the data were pointed out. Since there were three respondents from Company C, the results concerning this company are the most solid. However, as noted earlier, the number of respondents was small and their position in the company affected the results. This increases uniqueness and limits the confirmability of the results. In addition the learning curve in conducting interviews causes bias. To increase confirmability, the findings were reviewed and discussed with the supervisors familiar with the case companies.

The study had a deductive approach starting from a literature review and a hypothesized framework. The empirical part leaned on the literature. The results are therefore limited by the perspectives chosen. The study could have been conducted using a more inductive approach. If this was done, there would not have been a predetermined view on external or internal environment. Instead they would have emerged based on interviews and could have been far from those chosen for the thesis. Moreover the methods used in the study set limitations. Only qualitative data collection methods were used and no methodological triangulation occurred. In qualitative studies the researcher is responsible for accurately and objectively reporting the results. As all the data collection and analysis was conducted solo, investigator triangulation is practically non-existent.

The amount of case companies was small as there were only four of them. Therefore there were no saturation but the cases are unique. As there are no cases to reinforce the results and all the case companies were Finnish, the generalizability of the results is limited. However, there is no agreement on the preferable number of case companies (Yin 2009). Based on the results, four unique cases were enough to provide new findings and to point out research directions.

The limited number of case companies brings about the need to study the relationship between the business ecosystem and competitive advantage using a larger sample size. Future research could address the same research questions as the thesis by conducting further interviews in a larger number of companies. These would further clarify what kinds of ecosystem characteristics need to be taken into account and reveal sources of competitive advantage missing in the literature. Afterwards a survey built on the interviews could be conducted. Here the sample size could be raised and random sampling used. A survey would bring a quantitative method to the research on this specific topic and allow for methodological triangulation. A large quantitative study would also allow for evaluation of correlation between certain ecosystem characteristics and sources of competitive advantage.

In addition, it would be interesting to further examine what kinds of ecosystems exist and to create a typology on them. According to this study at least the number of ecosystem members and the relationships between them are of great interest but semi- or unstructured interviews conducted in a larger number of case companies could reveal other important characteristics. Based on typology it would be interesting to find out what special challenges and opportunities the ecosystem characteristics create and how companies answer to these challenges and opportunities.

As for future research, the interviews in the case companies only elucidated one side of competitive advantage. What a company believes is a source of competitive advantage might not be so from the viewpoint of a customer. Thus it would be beneficial to study customer companies too and to find out why they are customers for the case company and what differentiates the case company from its competitors. Moreover it would be interesting to know why certain potential customers turn down the case company and why a competitor’s solution is preferred. This would enable benchmarking of winning companies resources and capabilities as well as their ecosystems.

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APPENDIX A: INTERVIEW OUTLINES (ONLY AVAILABLE IN FINNISH)

0. Taustoitus
    - kiitos osallistumisesta
    - oma esittely
    - tutkimuksen tarkoitus ja tämänhetkinen tila
    - luottamuksellisuus ja anonyymius, yrityksen nimen käyttö
    - tulosten luonne, diplomityön julkisuus, mitä datalle tapahtuu työn jälkeen
    - yhteenveto tutkimuksen tuloksista, milloin
    - lupa nauhoitukseen, ”ei tarvitse kirjoittaa kynä sauhuten muistiinpanoja”
    - teemojen summaus, käytettävissä oleva aika
1. Esittäytyminen
    - kuka olet, mikä on asemasi yrityksessä, kuinka kauan olet ollut yrityksessä?
    - mitä yritys tekee?
2. Kilpailuetu
    - Taloudellinen suorituskyky
        i. ketkä ovat yrityksen keskeiset kilpailijat?
        ii. arvioisitko yrityksen menestyvät taloudellisesti paremmin, samanarvoisesti vai huonommin kuin kilpailijansa tällä hetkellä? entä tulevaisuudessa?
    - lista kilpailuetua tuottavista tekijöistä
    - miksi valitsitte juuri nämä tekijät?
3. Verkosto
    - Verkosto (liiketoimintaekosysteemi): Monista toimijoista (esim. asiakkaat, toimittajat, jakelijat, täydentäviä tuotteita tarjoavat yritykset, jne.) koostuva monimutkainen ja teollisuuden alan rajat ylittävä kokonaisuus.
    - Verkoston ominaisuudet
        i. toimiiko yritys useissa verkostoissa (mahdollisesti eri rooleissa)? keskity tyypilliseen
        ii. mitä toimijoita verkostoon sisältyy?
        iii. millaisia suhteita verkostossa on? kilpailua, yhteistyötä
        iv. onko verkosto vakiintunut vai tapahtuuko siinä muutoksia?
    - Yrityksen rooli verkostossa
        i. kuvaile yrityksen omaa paikkaa tyypillisessä verkostossa
        ii. millaiset suhteet ovat verkoston muihin toimijoihin?
        iii. millaista yhteistyötä yritys tekee?

iv. kuvailisitko yrityksen roolia enemmän suunnannäyttäjäksi, hallitsijaksi vai niche peluriksi?
v. onko yrityksellä erilaisia rooleja muissa verkostoissa?

- Verkosto ja arvonluonti
  i. saako asiakas arvoa siitä, että yritys toimii nykyisessä verkostossaan? millaista?
  ii. miten verkosto vaikuttaa asiakkaan kokemaan arvoon? valitseeko asiakas yrityksen vai verkoston?
  iii. miten edellä listatut kilpailuetutekijät vaikuttavat arvonluontiin verkoston näkökulmasta?

4. Vaikutus
   - verkoston vaikutus kilpailuedun lähteiden valintaan
     i. vaikuttiko verkosto kilpailuedun lähteiden valintaan?
     ii. mihin niistä?
     iii. miksi/miksi ei?
     iv. miten?
   - haastattelun vaikutus
     i. muuttuiko käsitys kilpailuedun lähteistä verkostokeskustelun jälkeen?
     ii. miten?
     iii. miksi?
5. Lopetus
   - jäikö jotakin käsittelemättä
   - vapaa sana, kommentteja aiheesta
   - kiitos osallistumisesta
   - tulokset saatavilla diplomityön valmistuttua toukokuun loppuun mennessä

Lista kilpailuetua tuottavista tekijöistä:

	Suhteet ulkoisiin sidosryhmiin kuten alihankkijoihin ja asiakkaisiin
	Patentit, liikesalaisuudet
	Johdon ja muun henkilöstön väliset suhteet
	Maantieteellinen sijainti
	Tilat ja tarvikkeet, tuotantokoneet
	Innovaatiotoiminta
	Teknologia
	Hinnoittelu
	Verkoston valmius uuden tuotteen lanseeramisessa
	Organisaatiokulttuuri
	Henkilöstön osaaminen ja kokemus
	Ylin johto
	Onni/tuuri
	Maine, brändi, tuotemerkki
	Yhden tai useamman toimijan kesken jaetut resurssit
	Kuuluminen tiettyihin verkostoihin ja niiden toiminta
	Lainannosto kapasiteetti
	R&D tilat ja henkilöstö
	Tiedon siirtyminen yrityksen sisällä
	Yrityksen ydinarvot
	Nopea sopeutuminen